PROCEEDINGS

Defense Symposium On

"Defense Acquisition Reform: Challenge to Government, Industry, and Academia"

Fort Lesley J. McNair
Washington, D.C.
26 April 1994

Hosted By

The National Defense University
The Defense Acquisition University
The Industrial College Of The Armed Forces

Sponsored By

The American Defense Preparedness Association
The Association Of The Industrial College Of The Armed Forces
The Association Of The U.S. Army
The Air Force Association

135 pg

FOREWORD

"Our liberties rest with our people, upon the scope and depth of their understanding of the nation's spiritual, political, military and economic realities. It is the high mission of the Industrial College of the Armed Forces to develop such understanding among our people and their military and civilian leaders."

Dwight D. Eisenhower, ICAF 1933
President of the United States
at the dedication of the academic building of
the Industrial College of the Armed Forces
September 6, 1960

In keeping with the mission cited in President Eisenhower's 1960 address, the Industrial College of the Armed Forces has bought together leading members of government, industry, and academia to discuss one of the most critical issues facing the nation: acquisition reform. The attached Proceedings capture the thoughts of those leaders and, along with the papers included in this document, provide a comprehensive examination of what needs to be done at the strategic level to reform the Defense Acquisition process to meet needs in a more efficient, effective, and responsive way. We hope the Proceedings will provoke ideas, and actions, to further the effort to forge a strong partnership among these institutions.

The Army Industrial College, which was established in 1924 as a national institution to prepare for mobilization of the industrial base during periods of national emergency, was reorganized in 1948 as the Industrial College of the Armed Forces (ICAF) and assigned the following mission: To prepare selected officers of the Armed Forces for important command, staff, and planning assignments in the national military establishment and to prepare selected civilians for important industrial mobilization planning assignments in any government agency, by: (1) Conducting a course of study in all phases of our national economy and interrelating the economic factors with political, military and psychological factors; (2) conducting a course of study in all aspects of joint logistic planning and the interrelation of this planning to joint strategic planning and to the national policy planning; and (3) conducting a course of study of peacetime and potential wartime governmental organizations and the most effective wartime controls.

In 1976, the Secretary of Defense and Joint Chiefs confirmed the ICAF mission to be:

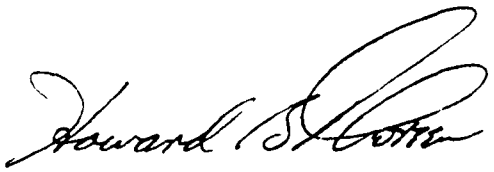
To conduct senior level courses of study and associated research in the management of resources in the interest of national security in order to enhance the preparation of selected military officers and senior career civilian officials for positions of high trust in the Federal Government. Included in the scope of the charter is the study of major policies and problems involved in Department of Defense procurement and distribution of material required for national defense. The National Defense Authorization Act for FY

1991 directed the DoD to establish "a senior course as a substitute for, and equivalent to, existing senior professional military education (PME) school courses, specifically designed for personnel serving in critical acquisition positions." On 1 July 1991, the Under Secretary of Defense (Acquisition), in recognition of the ICAF mission, announced that the ICAF would present the senior course for Acquisition Corps members.

The ICAF mission related to acquisition received little national attention during the last several decades due in part to the lack of any national emergency that would require a surge in industrial production for defense purposes. Additionally, "national security" was defined largely in terms of military security. Two significant events have occurred during the past decade that have focused attention on the Industrial College. First, the concept of national security has evolved to include economic security. While the economic component of national power and security was explicitly recognized in the 1948 and 1976 charters, the Industrial College had concentrated its studies and research on the mobilization of resources for situations such as WWII. With the increased recognition that economic well-being was critical to national security in its own right in addition to is role in supporting military mobilization, the focus of the Industrial College shifted toward a study of the industrial base in general, and its ability to support defense needs.

The second significant event that shifted the Industrial College focus was the collapse of the Soviet threat. This has had enormous consequences for the entire area of national resources management, to include DoD acquisition policy, Federal support of research and development (R&D), and the relationship of defense industry and the commercial sector. As the nature of the threat has changed, there has been the inevitable draw down of the military establishment, accompanied by severely reduced R&D and procurement funds. This has required a fundamental shift in the way we approach the economic dimension of national security and has raised a number of questions about the role of the Federal government in economic activities outside the specialized defense sector.

As the boundaries between the defense and commercial industrial sectors have become blurred, the Industrial College has played an important role in articulating the relationship of these industrial sectors. The College is continuing to serve as a focal point to bring together industry, government, and academia to discuss important issues related to national security.



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SPRING SYMPOSIUM 1994

"Defense Acquisition Reform: Challenge to
Government, Industry, and Academia"

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	VADM Howard B. Thorsen. USCG (Ret.), President, Association of the Industrial College of the Armed Forces
	Maj. Gen. James E. McInerney, Jr., USAF(Ret.), Vice President, Membership & Chapters, American Defense Preparedness Association
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1530-1600	CLOSING SPEAKER: Dr. Jacques S. Gansler, TASC

EXECUTIVE SUMMARY

The focus of this symposium was Defense Acquisition Reform: Challenge to Government, Industry, and Academia." As such, it concentrated on a specific subset of the broader topic of the 1993 ICAF Symposium "Government, Industry, and Academia (Research): Partnership for a Competitive America."

The 1993 ICAF Symposium was designed to focus on the industrial base only as it impacts on national security, mindful of the ideological antipathy toward government intervention in the commercial sector. The participants in the symposium, however, realized that the issue could not be ignored; the government currently intervenes and has always intervened in the marketplace. In the case of defense industry, this intervention has been accepted by a bipartisan consensus. Intervention in the non-defense sector is much more controversial. The new policies resulting from the decrease in defense spending, and the concomitant shrinking of the defense industrial sector, brings this controversy to the fore.

With respect to the changing nature of the DoD acquisition process to meet the changing conditions, the 1993 Symposium participants dealt with several questions. Shall we attempt to protect the defense industry sector in a mode that would allow quick mobilization as in the past? Do we only keep a "warm base" in those industries that are "defense unique?" Or, does modern technology allow us to rely on dual technology that will meet the needs of both defense and commercial needs? If the latter, what is the proper role of government in supporting the generic R&D required to keep a technological edge? Is it better to leave this to the marketplace with government macro policies designed to establish an environment conducive to R&D, or should the government target specific sectors as it has in the defense sector?

There is general consensus that the source of America's defense and economic security is the national science/technology and industrial base. It is the combination of people, institutions, scientific and technological know-how, and facilities used to design, develop, manufacture and maintain the weapons and supporting defense equipment and commercial products needed to meet U.S. national security and standard of living objectives.

In recent years, however, numerous studies and analyses by government, industry, and academia of defense downsizing, conversion and adjustment and commercial competitiveness have reached significant and disturbing conclusions:

For the Defense Industrial Base: signs of serious weakness, including the high cost of weapon programs, growing dependence on foreign sources for critical components, shrinking numbers of subcontractors doing defense business, regulatory controls that increase the cost of conducting defense business, and a lack of a national defense science/technology and industrial strategy/policy along with uncertain and decreasing funding levels. Coupled with the absence of a close working relationship and adequate planning information, defense corporations are responding by:

- Eliminating personnel.
- Reducing facilities.
- Cutting investment in new technology and physical plant.
- Attempting to increase arms sales abroad.
- Attempting to diversify into the civil sector.

For the Commercial Industrial Base: Here too, U.S. industry at large shows signs of systemic weakness which is hampering the ability of many firms to adapt to a changing global business environment. These signs include:

- Government, industry and academia working at cross purposes.
- Inadequate investment in commercial R&D.
- Neglect of human resources.
- Short time horizons.
- Outdated strategies in productivity and manufacturing.

Does the nation need a long-term science/technology and industrial strategy that provides a predictable planning environment for government industry and academia? Should Congress and the Executive Branch demonstrate leadership by crafting a broad strategic approach to the Nation's future national security needs, at the expense of some immediate political and economic concerns?

Many recent studies emphasize the central theme that government, industry and academia must steadfastly share in the partnership for establishing new national priorities to move into the next century and retain America's global leadership in military and com-

mercial industrial competitiveness. The current course of U.S. industrial research, development, production and commercialization demands innovative policies, programs and initiatives. Shall government, industry and academia join to help forge new national priorities responsibilities to capitalize on our nation's strengths and shore up our weaknesses to compete? How does Acquisition Reform relate to these requirements?

As we shift to an era of more limited resources, it is imperative that the acquisition process be more efficient, effective, and responsive than ever before. Meaningful reform of the acquisition system must be a cooperative enterprise in which government, industry, and academia work together in a true partnership. The symposium provided a forum for representatives from those sectors to engage in open, candid dialogue about a strategy for genuine acquisition reform.

This one-day event brought together some of the nation's most prominent leaders and thinkers in a two part debate aimed at first articulating the goals and strategies for meaningful acquisition reform then crafting a action plan for the ways and means to achieve them. The symposium aimed at exploring defense acquisition reform in its broadest context, examining the nation's scientific, technological, and industrial base along with the laws, regulations, and practices which affect its health and responsiveness to the defense community's acquisition needs while strengthening its commercial competitiveness both domestically and globally. This meeting provided a unique vehicle for frank discussion with senior decision makers in confronting roadblocks and forging new paradigms of thought and practice for the 21st Century.

REMARKS BY PANELISTS

The two keynote speakers, Mr. Joseph T. Gorman, Chairman and CEO of TRW, Inc., representing industry and Admiral William A. Owens, Vice Chairman, Joint Chiefs of Staff, representing DoD, provided an excellent context for addressing the central issues of acquisition reform. Mr. Gorman chose to focus on the profound strategic transformation that is taking place throughout the world. This change imperils the American dream and puts us in grave danger of losing the greatness and goodness that has made us leaders in the world. We have a crisis on our hands, a crisis that is tearing apart our economic, political, and social fabric. The causes are many and complex, but Mr. Gorman stressed some of the most critical. One of the most disturbing trends is the increasing loss of confidence in where the nation is going and in the institutions that are charged with leading us. Public opinion polls show a steady erosion in confidence in all government institutions as well as private institutions such as religion, the medical profession, etc. Moreover, the educational system is failing to prepare us for competition in the global economy. This failure cannot be laid at the feet of the formal school system alone; the community, industry, and other institutions must share blame and we must all cooperate to solve the problems. For example, Mr. Gorman described a project with the national Business Roundtable to make systemic change in schools. It involves all 50 states and requires legislation in all these states. The effort is a ten-year commitment involving 200 companies. They are forming coalitions with communities, parents groups, and other key institutions. Mr. Gorman stressed that we must mobilize the commitment of all people in a cooperative effort of government, industry, and the people. Anything less will endanger our future.

Admiral Owens echoed Mr. Gorman's conclusion that there have been profound changes in the world; those changes are still occurring and no one can predict where they will end. Our challenge is to be prepared to respond in a way to ensure we do not jeopardize our security. He cited the example of the far-reaching changes in the Soviet Union, its military posture, and the implications for our defense posture. The world is not the one we faced for 40 years, but it is still a dangerous world. We must retain our defense preparedness, but we need new paradigms to guide our strategy and policies. He focused on DoD management practices that must respond to these changes. With a shrinking budget and a large portion of it taken up by fixed costs in infrastructure, we must be aggressive in reducing these fixed costs by following through with the Base Realignment and Closure (BRAC) program. This will be a tough fight, but we must persevere. Another thing we must do is continue to emphasize jointness. We must do this because it will produce a more effective fighting force and it is more efficient. Interoperability is a must for modern warfare; we cannot afford to have Services on different wavelengths in doctrine, materiel, or operations. Admiral Owens described several steps they are taking to improve jointness. A new process has been implemented in the Joint Requirements Oversight Council (JROC) to emphasize functional analyses that cut across Services' mission areas. For example, they are looking at joint strike surveillance reconnaissance, intelligence, the mobile battle field, information warfare, and strategic lift and its protection. This joint perspective will provide a more valid, useful Chairman's

Program Assessment, leading to a better foundation for capabilities assessment and budget decisions. We simply cannot rely on civilians without the requisite military experience to make such assessments, nor can we allow Services to make decisions from their unique perspective. JROC will work closely with the Services, the CINCs, and OSD to ensure that there is a synthesis of perspectives. Admiral Owens also cautioned about the tendency in some circles to abandon the "Two Major Regional Conflict strategy. Although the draw down will reduce our forces significantly in the out-years, by that time we will have improved technology that will allow us to execute that strategy. We already have the ability to do many things we could not do in Desert Storm and we will have much more capability by the turn of the century.

PANEL: Strategies for Re-engineering the Acquisition System

Dr. Oscar opened the panel by describing the Army's strategy to reform the acquisition process within the framework of current legislation and OSD regulations. Relying on state-of-the-art computer technology, the Army has created "Battle Labs," using distributed interactive simulation to do virtual prototyping. This permits the concept to production cycle to be reduced from years to months. They also can hook up interactively with soldiers to include the human factor component in systems design. At the same time, they train soldiers. He described how they are able to test more complex strategies such as horizontal technology integration. An example of this is the placement of "little black boxes" in tanks and helicopters that can provide screen displays of real time intelligence; the battlefield is displayed to the front line soldiers. The Army is also changing the way it is procuring equipment. They are taking advantage of flexibility already inherent in regulations to waive many of the bureaucratic procedures that have been practiced in the past. They are using "best value" contracting, waiving specifications and standards where appropriate, and authorizing direct vendor delivery. The Army has initiated another innovative program called "partnering." This is a process wherein the Army managers and the producers sit down, apart from the contract, and agree on procedures to work together and resolve problems without litigation. This has been very successful in fostering a cooperative relationship rather than the traditional adversarial, legalistic relationship. Another innovative program sends "roadshows" throughout the Army Material Command to educate the workforce on the new way of doing things--to facilitate cultural change. These roadshows have been very effective.

General Drewes described the Air Force's current acquisition reform initiatives under current legislation and OSD regulations. He began by saying that the most general requirement was to change culture--the attitudes and habits of doing business the old way. He praised the OSD initiatives such as the pilot programs and the Process Action Teams (PAT) that are looking at specific sectors such as the micro-electronics industry and processes such as specifications and standards. Working with RAND, the Air Force is making a systematic analysis of how we do acquisition. Why does the Air Force add new layers of rules and regulations on the DoD policies and regulations that already cover the process? Their goal is to move away from bureaucratic red tape and rely on general guidelines and judgment of program managers. The Air Force now has over 20 pilot programs to test the ideas surfaced in their self analysis and is working to establish a single point of contact who can waive any Air Force regulation or policy. While some are skeptical about whether the Air Force can carry through such delegation of authority, General Drewes believes it can. The Air Force also took a close look at how commercial companies operate and found some useful ideas for change in the Air Force. Other findings reinforced conclusions already made, e.g., reduction of specifications and standards. Another example was the practice of requiring annual representation certifications. The Air Force is also streamlining its Request for Proposal format to simplify it. General Drewes closed with a return to the theme of cultural change as a prerequisite for real acquisition reform. He complimented the Army's "roadshow" program as a useful technique in promoting cultural change.

Mr. McLuckey opened his remarks with the observation that there is not enough manufacturing in U.S. industry. The problem facing us is not so much "conversion" of defense industry as it is "preparation of the industry so that it can produce for both the defense and commercial markets free of the onerous requirements imposed by defense acquisition practices. He contrasted the way industry does business with defense and commercial customers by citing the defense-unique requirements for detailed specifications and standards, numerous audits, and unique contract requirements. These add 20-40% to costs. He then listed several changes he would like to see in new legislation. Lift the threshold of Truth in Negotiations to $500 Thousand indexed to inflation; eliminate cost/pricing certification on competitive procurements; increase simplified acquisition

threshold to $100 Thousand, passed on down to lower tiers; eliminate recoupment charges on Foreign Military Sales (especially if it is targeted toward specific countries); simplify contract financing, with specific changes in the progress payment process. With respect to OSD initiatives, Mr. McLuckey sees the Process Action Teams program as a step in the right direction. Industry is waiting to see the results of some of this, particularly the policy change on specifications and standards. But, he noted, there has been strong cultural resistance to change. Changes to FAR and DFAR must cut across Services. Other specific changes that are needed: Shift a greater percentage of depot work to the commercial sector; find ways to shorten the procurement cycle. He closed his remarks by stressing that acquisition reform is an absolute must and that it must be pervasive change, not peripheral. We should quit talking and get on with it.

Ms. Preston brought to the symposium the latest insights from Congress. She had just returned from the Hill, where she was working on the markup of the Senate Acquisition Reform bill (S.1587). She listed the major legislative priorities of OSD for the legislation and assessed the prospects. She observed that the previous speakers had set the stage for her remarks, because they identified the problems OSD was trying to remedy. The three priorities for OSD are: 1) Authorization of the pilot program; 2) removing impediments to the purchase of commercial products and removing impediments to defense companies to make them more competitive in the global economy; and 3) increasing the simplified acquisition threshold to $100 THOUSAND. They hoped to have the bill passed by mid-May (It was passed in June); however, there are problems with getting political consensus. One of the most controversial relates to the Buy American Act. DoD asked for a blanket waiver, because it is difficult to determine how much of an end item is made in, or out of, the U.S. As a compromise, conferees agreed that in any circumstances in which a U.S. product would be at a disadvantage by using the Buy America test, DoD may waive requirements specified by the Act. With regard to amending the Truth in Negotiations Act on cost and pricing data, DoD seems to have been halfway successful in selling the idea of letting the contracting officer have flexibility in deciding when cost pricing data is required. The big change in policy would be that the contracting officer can ask for cost/pricing data only if she/he cannot make a determination by other means.

Ms. Preston discussed other legislative goals they are seeking: Authority to do direct 8-A Contracting; relief from sub-contracting plans for commercial items; elimination of recoupment for FMS (this was deleted in the HASC markup); and resisting Congressional efforts to establish new prohibitions on the use of task and delivery order contracts. The net result of DoD legislative activities is that we are taking two steps forward and one backwards. She then turned to a discussion of the Process Action Teams (PAT) program and focused on two. The PAT looking at the Electronic Commerce, Electronic Data Interchange (EC/EDI) is examining the proper role of OSD in facilitating an interservice agreement to develop an EC/EDI capability. The PAT looking at Specifications and Standards has produced a report that has been approved by the Secretary of Defense and a memorandum is being coordinated. Other PATs will look at such issues as requirements determination and resource allocation, revision of DoD 5000.1 and 5000.2, and DAB process and documentation.

PANEL: Question and Answer Session

Three issues were raised in the Q and A period. The problem was raised of losers in a bidding process going to Congress to appeal the decision. Winners never know if their work will be halted, or the decision reversed. The ensuring discussion provided no definitive solutions, but Ms. Preston said they had been able to get a provision in both the HASC and SASC bills that would delay performance under a contract until the protest period has expired. Both Dr. Oscar, the Army representative, and General Drewes, the Air Force representative, said they have initiated a program of providing more thorough debriefings for bidders and this has significantly reduced protests.

The question was asked about the "Congressional Dynamics" of the HASC decision to delete the Recoupment provision. In summary, the Anti-Arms Race element was more vocal and influential than those who want to use Foreign Military Sales to keep a defense industrial base and support the defense industry in general.

Another question asked if the removal of specifications and standards would not endanger the quality of our material. The panel members stressed that there was no intent to remove all specifications and standards. One must use good judgment. Some that have been required are ludicrous, others essential. The policy in the future is that one starts with the presumption that they are not needed. This may require more emphasis on "best value" purchases rather than low bids.

PANEL REMARKS: Implementing the Strategy-Challenges and Choices

Dr. Denman's remarks focused on the technology in ARPA programs that relate to acquisition reform. The ARPA program is based on the overall strategy to move towards an integrated industrial base, to break down the barriers between the defense and commercial sectors. These barriers derive from laws, policies and rules, and a long culture of doing business within these barriers. Key to this strategy is what is now called dual-use technology; that is ARPA's focus. The best known component of this focus is the Technology Reinvestment Project (TRP), which had $470 million to support it in FY93. Even though the decision to fund it was late, ARPA received 3,000 proposals, of which 200 were awarded. The program will be funded at $625-650 million a year. About 80% of that will go to the development of dual-use technology. Actually, other programs in ARPA fund dual-use technology, so that about $1.8 billion a year goes to this. There are several reasons for the emphasis on dual-use technology. Although the ARPA interest must remain rooted in the military need for a particular technology, the relationship with commercial needs is complex and subtle. For example, we may spin off military technology to commercial use in order to preserve access to a key technology that we are in danger of losing during downsizing. While the support of such technology also has an overall impact on the economy, the primary motive for ARPA support is to support defense needs. Another ARPA technique is to "spin in" technology from the commercial sector. This refers to our efforts to identify and nurture commercial technology that has military usefulness. The third category of support is new dual-use technology development. ARPA is not picking winners and losers in the literal sense, but is making choices about where to invest. The key factor in this category is identifying emerging technologies that will have both commercial and defense application. For example, ARPA is strongly positioned in information technology, both hardware and software. In doing its business, ARPA has congressional authority to work with industry outside procurement contracting laws, rules, and regulations. More than half of the ARPA program is now in the form of agreements outside the contracting rules.

Ms. Garman brought to the symposium a timely perspective from Congress, where she was the key staffer on the HASC action on the Acquisition Reform legislation. She emphasized the importance of acquisition reform by mentioning several bills in congress dealing with the issue. There is a clear intent in congress to act; there is a bipartisan commitment to this. All interested parties must recognize, however, that no constituency will be totally satisfied, since the art of compromise always carries the day. This will be the most comprehensive acquisition proposal since the Competition in Contracting Act; it has been in the works for four years, starting with the Section 800 Panel. The principal guiding goal of the proposed legislation is to strike a more equitable balance between the number of Government-unique requirements in procurement and the need to lower Government contracting. The proposal lifts low-value procurement to $100 THOUSAND, exempts commercial items from specification requirements, gives some relief from cost accounting and certification requirements, and limits flow-down requirements to sub-contractors. The bill also provides for an electronic bulletin board for small businesses to use, establishes a $2,500 threshold for micro purchases, modified bid and debriefing procedures and raised the Truth in Negotiations threshold to $500 THOUSAND. Of course, no one knows what the final bill will look like to get the necessary votes for passage. There are many special interests that have parochial interests or false perceptions of what we intend to do. This is a fragile bill and it can fall apart if people pick at it too much. There are also internal turf battles within congress.

Mr. Odeen opened by saying that he was encouraged by Ms. Garman's remarks, but that there are a lot of impediments before the HASC bill goes through. He cited the lack of strong support from the White House for the Pentagon proposals. In too many cases in the past, acquisition "reform" has made things worse, but it appears this effort might be different. The relationship between industry and government has deteriorated during the last 10-15 years and it appears we are beginning to reverse this. For example, there is a much different, more cooperative atmosphere at ARPA. It is essential that we recognize that the defense industrial base can no longer be viewed in isolation; it is too small and inflexible to response to defense needs. We have to look at the entire industrial base and integrate the commercial and defense sectors. We have done this in the past (e.g. WWII and Korea) and must do it again. The easy money in the 80's moved us toward a more DoD unique industrial base.away from that. Mr. Odeen suggested several steps that need to be taken, including passage of reform legislation. He mentioned several of the items discussed by previous speakers, e.g., raising thresholds, pilot programs, and greater flexibil-

ity in purchasing commercial products. But even if we get meaningful legislation, real change must come from within DoD. There are many things DoD can already do under current legislation if we are more aggressive. Colleen Preston, John Deutch, and Bill Perry agree and are acting. If and when we get pilot program authority, it needs to be used effectively. DoD also should look at the large and costly oversight structure it has. There needs to be a better ratio between the number of people engaged in development and production and the number of people overseeing the acquisition process. The last point he made was that DoD must reduce its infrastructure and pursue the BRAC effort aggressively. Specifically, more depot maintenance functions need to be transferred to the commercial sector.

VADM Bowes provided the Navy's perspective and a summary of activities of the Navy to reform acquisition activities within the framework of current laws and DoD regulations and policies. He opened by expressing concern that Congressional interests in socio-economic goals not prevent purchase of commercial products. With respect to what we can do within current rules, OSD is leading the way. As we implement the new policy of delegating authority, we must not be so risk averse; there must be more trust. Another positive step is the close integration of acquisition and requirements. The Navy strategy for reform within current legislation is to reduce infrastructure, focusing on life cycle management, and integrate common processes for development, acquisition, and support across all systems. To illustrate this strategy, within the Naval Air Systems Command we are downsizing our infrastructure, reducing personnel by 44 percent. The idea is to do only what the Navy needs to do. For those things we retain, we will accomplish our work through integrated program teams. The Services are getting together to learn from each other and eliminate unnecessary duplication of capabilities. In summary, the Navy is working in partnership with industry, with other Services, and Agencies in an effort to reduce redundancy and unnecessary duplication.

Dr. Gansler chose to put the previous speakers' remarks into some analytical perspective. First, the challenge is threefold: Get the best weapons in the world at much lower cost, maintain an effective and responsive defense industrial base, and use some of the defense R&D, production and support dollars to aid the economic growth and industrial competitiveness of the nation while serving defense needs. The challenge is to transform the industrial base and the DoD way of doing business in order to meet these goals. The defense sector has become isolated from the commercial base, even within the same company. The task is not so much conversion as it is diversification and integration of defense and commercial sectors. This will be difficult and there are serious management problems and gold-plated military specifications. The key to this integration is to make use of dual technology, dual production, and dual use equipment. With this flexibility, defense will have a larger industrial base on which to draw to meet its needs during peacetime, reconstitution and surge production. As we do this, we must distinguish between those sectors which have little, or no, potential for dual production (e.g., submarines) and those that are compatible (e.g., electronics). The military logistics system is also antiquated and must be transformed. Dr. Gansler summarized his presentation with the admonition that we have a crisis; congress must understand this; the Executive Branch leadership must recognize this, and we must effect radical reform. Current laws do not prohibit DoD from making many of the major reforms, and Bill Perry, John Deutch, and Colleen Preston are moving aggressively. The Process Action Teams, Pilot Projects, and delegation of decision-making are moves in the right direction. He urged conferees to leave with the conviction that profound change in the way we do business is not an option, it is an imperative.

INTRODUCTORY REMARKS

RADM SMITH, VADM THORSEN, AND MG MCINERNEY

RADM SMITH: Welcome to the Industrial College of the Armed Forces and to this timely seminar on DoD Acquisition Reform. I hope I am welcoming back the many who participated in last year's symposium on the industrial base right here in historic Baruch Auditorium.

ICAF is pleased to host and provide our facilities to support this meeting. We thank all of our sponsors, especially the Association of the Industrial College of the Armed Forces, the American Defense Preparedness Association, the Association of the United States Army, and the Air Force Association, who have collaborated in organizing this event and acquiring the participation of many fine speakers.

Today's speakers and panel members are drawn from the spectrum of professionals who are vitally concerned with acquisition and, thus, the process to improve it. We will hear from those working the legislative process in the Congress, leaders in the Executive Branch charged with making acquisition policy, and those who conduct our acquisition business in the military departments. We are please to have several outspoken representatives of our vital private industry, a sector which needs to be heard and heeded as the Government reengineers its acquisition process.

The academic and analytic sectors are also represented here today as well, and I am proud that some of our fine ICAF faculty will be participating in today's panels.

We need to say a few words about this institution. Since its founding in 1924 as the Army Industrial College, ICAF has been teaching acquisition. Reorganized as a joint senior war college after World War II at the direction of former ICAF faculty member, President Dwight D. Eisenhower, ICAF has provided rising senior leaders with a graduate-level education in management of national resources, including acquisition, logistics, mobilization and analysis of our industrial base.

We are your military's graduate school of business for senior officers and civilians of the Army, Navy, Air Force and Marine Corps. Twenty percent of our student body are civilians from DoD and non-DoD agencies, including seven from the Department of State.

We believe and teach that understanding the national economy in its preparedness to support our national security strategy is as vital to our well being as mastery of strategy and development of weapon systems.

ICAF is a component of our National Defense University here at Fort McNair, but we are also a participating institution in the Defense Acquisition University. Under these auspices we provide the Senior Acquisition course for those professionals in the Defense Acquisition work force.

I would like to recognize some of our distinguished guests here today. Those who speak or participate in the panels will be introduced as they come up. In addition, I would like to introduce Lieutenant General Paul Cerjan, President of NDU, Ambassador Howard Walker from the State Department, the Vice President of NDU, Dr. James McMichael, Director of Acquisition Education Training and Career Development and Acting President of Defense Acquisition University, and Mr. Gerald Keightley, who is the Executive Director of Defense Acquisition University, and Colonel Claude Bolton, who is the Commandant of the Defense Systems Management College, our sister institution in DAU and also a major educator of acquisition professionals. We are particularly happy to have Colonel Bolton because he brought sixty of his fine students from DSMC here today.

We knew that Defense Acquisition Reform was a timely and vital topic when we selected this date. What we didn't know is that would coincide with the date that the Senate Armed Services Committee was to conduct its markup on pending legislation in this area and that would affect those who had been invited and agreed to participate.

This has caused some changes in the lineup and in the times, and we ask you to be flexible as we make some real time changes to the program. But you will have to adapt to the real process of acquisition reform as well.

I have some administrative announcements to make, and if you get a chance note this down. If you need to have an incoming telephone message the number is (202) 475-0521. That will be manned. Incoming messages will be displayed on the message board near the registration desk on the first floor where you came in through the central door.

Refreshments at the scheduled breaks will be up one deck on our third floor. Our luncheon will be held in Marshall Hall, the big beautiful building that is landward towards the mall. The sign outside the Marshall Hall entry will direct you to the first floor multi-purpose room over there.

Your packet includes several handouts, including copies of official remarks on acquisition reform presented to Congress by Secretary Perry, Deputy Secretary Deutsch, and the DoD Deputy Inspector General Vander Schaaf. I commend them to your notice. You will also find a list of biographies of today's participants so we can shorten our introductions during the proceedings.

During the question and answer period please utilize that microphone which is attached to the seat in front of you. There is one for every four seats. Technical advice, please hold down the button while talking.

And at this time I would like to welcome to the microphone the President of our Alumni Association, the Association of the Industrial College of the Armed Forces, Vice Admiral Howard Thorsen, a graduate of the U.S. Coast Guard Academy and a naval aviator trained in Pensacola.

Admiral Thorsen served as the Commandant of Cadets at the Coast Guard Academy. He was chief of the Office of Research and Development, the office of Law Enforcement and Defense Operations at Headquarters Coast Guard right over here. He also commanded the Seventh Coast Guard District and the Coast Guard Atlantic Area and U.S. Maritime Defense Zone Atlantic. He is now retired, is a consultant and works on several Boards of Directors.

Ladies and gentlemen, please welcome Admiral Thorsen.

VADM THORSEN: Thank you, Jerry, and good morning. I will just take a moment to welcome each of you from the Alumni Association. The idea of holding a seminar originated with one of my predecessors, General Jack Merritt, who graciously offered the organizational services of the Association of the United States Army to bring industry academia and Federal Government representatives here at ICAF to discuss a current issue of strategic importance to our nation.

And it proved to be such a good idea that we have committed to making it an annual event. So I welcome you to the Third Annual Symposium, and please keep us in mind for next year because there will be another one and I'm sure there will be more than a few topics from which to choose that will keep the interest level high.

I want to publicly thank the Commandant, Admiral Jerry Smith and his point man again this year Dr. John Johns, Dean of Faculty and Academic Programs at the ICAF. We aimed very high to get the best participants, and Dr. Johns has proved invaluable again in reaching that goal.

The Association of the ICAF, the Alumni Association, is 1200 members strong and growing. We have only one primary goal, and that is to enhance and enrich what we refer to as the ICAF experience for students, for faculty and for graduates.

The ICAF experience is truly unique, a college where all the students are, without exception, experienced middle level managers and operators who have shown their potential for filling the most senior positions in leadership and staff, Government agencies, and military services. I know of no other college with such regular, frequent interchanges of ideas, perceptions and views between the students and visiting senior executives from industry, academia, military and Government.

For certain, ICAF is the only institution which conducts postgraduate executive level courses of study which emphasize the critical role of resource management within the broad scope of national security and strategy. Resource management includes many aspects, but certainly none is more important than the acquisition of material.

I am quite certain that everyone of us who has been or is now personally involved in the Federal acquisition process will agree that the procedures are so convoluted, so dogmatic, so complex, so detailed, so bad, it is small wonder that few procurements seem to satisfy either the customer or the supplier. And isn't that incredible? It seems axiomatic that in order for a business to compete and prosper, the vast majority of the sales must be satisfactory to both itself and to the purchaser.

Today's discussions should prove very interesting and enlightening. This auditorium has seen thousands of speakers and panel discussions. The Q and A sessions are always interesting, and I'm sure today's will undoubtedly add to the value of the prepared remarks.

As someone told us when we were students sitting in those chairs to always listen to the opinions of others. It may not do you much good, but it will them. Please keep in mind that we will publish all deliberations in the papers that have been solicited for this occasion, and you will receive a copy of that in not too many weeks.

Defense acquisition reform, a most compelling task

whose time simply must be upon us. It is fitting that we are assembled here in Eisenhower Hall. Some of his words will surely apply to the subject, for he said, "Accomplishment will prove to be a journey, not a destination." There is an undeniable need for improvement in the process of acquisition. It is time to begin that journey.

In closing I would like to recognize and thank General Jim McInerney and his staff at the American Defense Preparedness Association for their outstanding efforts in handling the myriad of logistic details which must be done well. Being a previous commandant has probably been a factor in keeping his spark of interest at high level.

General McInerney was also known, they tell me, as the world's greatest fighter pilot. There may be one or two in the blue suits in this audience that might dispute that, but you can take that up with him later on.

He graduated from West Point in 1952, a Royal Air Force Staff College graduate of 1964. He is a National War College Alumnus of 1970 and he commanded as Commandant of the Industrial College of Armed Forces in 1978. After retirement in 1980, he became the Vice President of Membership and Chapters of the American Defense Preparedness Association.

Please welcome and thank General Jim McInerney.

MAJ. GEN. McINERNEY: Thank you very much, Admiral Thorsen. It is a very great pleasure for me to come back here to this lovely auditorium, this great building that probably is one of the few buildings in the Department of Defense that is actually doing the task for which it was designed. I hope that Admiral Smith may not recognize some of the apparent deficiencies of that function, but it is really quite true.

We mentioned earlier on that this was the third in a series of seminars, annual seminars. The subject today, of course, is a moveable feast of defense acquisition reform. We will be visiting that next year, next year and next year. Not necessarily as the subject of the particular symposium, but it is something that as long as you are in uniform you will be dealing with.

So I hope you pay particular attention to some of the things that are said today because acquisition reform, as you can tell from the difficulty we have had in prying speakers away from the Hill, it is really a very, very hot topic in town today.

I want to congratulate the speakers, to express my appreciation to them for their flexibility in adjusting their schedule. Nobody has used the term yet this morning, but all of you must understand that flexibility is the key to air power, and I think our very distinguished speakers have displayed that.

It is a great pleasure for me to serve under two admirals, Admiral Thorsen and Admiral Smith, as a member of the ICAF Alumni Association. I hope all of you who qualify will take the opportunity to join that group. My responsibility is looking after the membership of ADPA. I can assure you that membership means a great deal to those kinds of organizations.

I am delighted to see my own chairman,

Mr. McLuckey, is one of your speakers today in the audience, and I know that he would probably hold me responsible if I didn't give you a very small commercial on ADPA.

It was founded in 1919 in the aftermath of World War I, which you recall we fought with weapons produced by other countries. Right now we are in the fifth downturn of our defense industry since the organization was founded. The good news is that we think we know how to handle many of the problems that are involved in it. We have been very, very active with the Executive Branch, very, very active on the Hill in forcing decisions, questions, the agenda in two very favorable areas.

The bad news is that the problem is tougher than it ever was, and it is going to take everybody in this audience, everybody connected with the Department of Defense, everybody involved in the defense industry to keep the show on the road.

We have had some 26,000 members spread around the country, 700 corporations, large and small, 58 chapters. Our chapter activities are something that I hope people in the audience take an interest in as you leave the Washington area and go out into the hinterlands where the real work is done.

The Washington Chapter is our biggest chapter. I am delighted to see several former Washington Chapter Presidents in the audience. The Washington Chapter Board is a group of very fine influential people here in town. Those of you who are not members of ADPA, check into this downstairs and you will get a little more information. We would like to see you join.

I would remind you that the dues are the lowest in the business. And joining ADPA doesn't mean that you have to give up the ICAF Alumni Association. I encourage you to join both groups.

So thank you very much. I will turn the podium back to Admiral Smith.

RADM SMITH: Thank you, Jim. Be prepared for your first shift, which occurs now. Admiral Owens, the Vice Chairman of JCS, was called to the Hill for breakfast this morning, and he wants to help us out here, so

he is going to swap places with our designated industry hitter here. Mr. Joseph Gorman will be first at bat this morning with an industry view.

In this case we followed the rule, if you have a tough job look for a truly busy person, and this man is he. A brief summary of about one-eighth of his biography starts out with being Chairman and Chief Executive Officer of TRW, Incorporated. He has been a Chairman since December, 1988, after serving as President and Chief Operating Officer since 1985, an association with that company that st irted in 1968.

An Indiana native, Mr. Gorman holds a bachelors degree from Kent State University and a doctorate degree from Yale Law School. He is the Chairman of the U.S.-Japan Business Council, the Chairman of the Business Roundtable's Education Task Force. He is Chairman of the Government's Industry Policy Advisory Committee for Trade Policy Matters, and Chairman of the Defense Industry Initiative Steering Committee.

He is one of three U.S. appointees to the Japan Import Board and is Vice Chairman of the U.S.-Canada Automotive Select Panel. He is a member of the Center for Strategic and International Studies, Strengthening of America Initiative, and the Trilateral Commission.

He is a Trustee of the Committee for Economic Development and is a member of the Business Roundtable, the Council on Foreign Relations, the Conference Board, the Business Council, and the Council on Competitiveness. I can't think of an individual in the United States who is better qualified to start us going on today's symposium than Mr. Joseph Gorman. In addition, he has kindly consented to take questions at the end of his presentation.

Ladies and gentlemen, please give a warm ICAF and symposium welcome to Mr. Joseph T. Gorman.

REMARKS OF MR. JOSEPH T. GORMAN
CHAIRMAN AND CEO, TRW, INC.

MR. GORMAN: Good morning, and thank you very much for that kind introduction. It reminds me a bit of what Lyndon Johnson said after a particularly flowery introduction. He walked to the podium, and in his deepest Texas drawl said, "You know, my friends, my only regret is that my parents weren't here to hear that introduction. My father would have enjoyed it and my mother would have believed it."

When you talk about being an acknowledged expert, the Admiral was kind enough to say that there is nobody more qualified than I to speak. I always think about "acknowledged by whom?" The great opera singer, Enrico Caruso, was in New York performing at the Met, and he was invited to this elegant dinner party on the upper east side. He showed up in his limousine and got out of his car in his finest attire, walked up and said, "I'm here for the party on such-and-such floor."

The doorman said, "Well, you will have to identify yourself and you will have to, of course, wait while we inquire as to whether you can be admitted."

He looked at the doorman and said, "But I am the great Caruso."

The doorman looked back and said, "No kidding, Robinson, huh?"

One of the prerogatives of a chief executive officer is to have his speeches written for him. One of the prerogatives of a chief executive officer is to tear that speech up and decide that you want to talk about something else. I have done that today. You are going to hear in this meeting more about the technical aspects of acquisition reform than you want to hear.

And I assumed also when originally asked to do this, Bill Perry was scheduled to be the lead-off speaker. I know Bill well, and I know what he was going to speak about, so I didn't want to cover all of that. I am sure all of you are also aware of, and you probably have read it, the plan for acquisition reform that was submitted by Secretary Perry to Congress in February.

So I am not going to spend my time on that. You will hear, I'm sure, much about that. Rather, I thought I would broaden my talk to focus on fundamental and profound change, the critically relevant external forces of change and the strategic transformation that all of this change implies for the Department of Defense and its key suppliers.

Now, some might say that this notion of the need is exaggerated. And to those who do, I would say that you are in pretty good company. Over the years a lot of good people have missed the mark about such things. Allow me to offer some illustrative quotes. "Heavier than air flying machines are impossible," Lord Kelvin, President Royal Society 1895. "Everything that can be invented has been invented," Charles Duell, Director of the U.S. Patent Office, 1899.

You will love this one. "Sensible and responsible women do not want to vote," Grover Cleveland, 1905. "There is no likelihood man can ever tap the power of the atom," Robert Millikan, Nobel prize in physics, 1923. "Who the hell wants to hear actors talk," Harry M. Warner, Warner Brothers Pictures, 1927. And finally, "And Babe Ruth made a big mistake when he gave up pitching," Tris Speaker, 1921.

Now, ladies and gentlemen, I submit that we are facing in this country nothing less than the very imperilment of the American dream. It was De Toqueville who said, "America is great because America is good, and America will cease being good when it ceases being great." And I strongly believe that we are in grave danger of losing both our greatness and our goodness."

Increasingly this is recognized by our body politic and by the public at large. Right before the election a poll that has been taken for 40 years was again taken. The results were astonishing. 80 percent of the people in this country say they believed that we are a nation seriously off track. Seriously off track. Never before in the history of that poll had the results shown a result that was outside the band of 40-60.

Of course, that is what elected President Clinton. People were voting for change, dramatic and profound change. It was, perhaps, because the Bush Administration didn't understand that old vaudeville truism of "you don't follow a banjo act with a banjo act" that he was defeated. President Bush did not understand, and unfortunately his people did not understand, that change is indeed required.

We have a crisis on our hands. One of major and growing proportion. One affecting all segments of society, one gnawing away at the vaunted standards of living that we have had all these years, and even our very quality of life. One tearing apart the social and economic fabric that made us both great and good.

In short, we have massive and profound social and economic problems. They are inextricably interrelated, and we as a society must attack both sets with a sense of urgency and with a sense of sustained commitment that are heretofore unprecedented. The causes are many. They are complex and mostly of our own making. So too must be our own solutions.

Now to those who must speak of blame, there is ample blame to go around. Public and private sectors, Republicans and Democrats, labor and management, and the list goes on.

It reminds me of the old German proverb which, loosely translated into English, goes like this," It is the duty of the old to lie to the young." Now, we have been doing a pretty good job of that in many of our institutions, not only government, but also both public and private. If they weren't outright lies, at least they would not pass the SEC full disclosure rules.

Now, I've mentioned our problems as massive and profound. You know them as well as I. On the social side, poverty, unemployment, illiteracy, crime, drugs, ghettos, unskilled workers, racial tensions, violence, teenage mothers, and again the list could go on.

On the economic side, budget deficits, trade deficits, lack of competitiveness in some arenas, loss of jobs, too often inferior quality, real wage declines, lower savings and investment rates, erosion of manufacturing base, crumbling infrastructures, and again the list could go on.

To understand the complexity and severity of all of this, I'll comment briefly on what I call our triple deficits. The domestic budget and economic deficit, the trade deficit, particularly that with Japan, and, central to it all, our education deficit.

Let's focus on the budget deficit for just a minute, because it is debilitating and undermining every one of our other goals. The deficit that we talk about is the $4 trillion. We have an underlying $14 trillion deficit, in addition to that, that is composed of the benefits we have promised each other over and above the take of taxes in the rest of our life times. Now the bulk of that, of course, is made up of entitlements, Social Security, Medicaid, Medicare, and the like, $12 trillion of the $14 trillion. That will not permit us, if we don't change dramatically and soon, to have any kind of sustainable economic growth. Why? Because as all macro economists will tell you, economic growth is a function of productivity growth. Productivity growth is a function of investment, investment is a function of the savings rate. We have the lowest savings rate in the industrialized world. A third of that of Germany. A fifth of that of Japan. It used to be around 10.5 % today it's 2.4 %. Is it any wonder that we have the lowest investment rates of any industrialized country in the world, therefore? It was 9% of GDP during the 40's through the 70's;, now its 3%. So it is in fact a function of the fact that we penalize savings and reward spending. That is the opposite of what we ought to be doing as a matter of policy. We soon will be operating at a $500 billion a year deficit by the late 90's, despite the fact that President Clinton's economic package made some headway. It was modest and it tinkers at the margin.

Let me talk about generational inequality. We spend $14 on the elderly for each $1 we spend on our children. Is that how a nation should invest it its future? I

submit that it is not. I have nothing against the elderly--I'm getting there myself, but there should be no more welfare for the well off. Again I don't want to criticize this administration. Directionally, President Clinton is heading in the right direction but it is not clearly enough. Take taxes. We absorb 40% of the taxes collected annually in this country, that's all the taxes west of the Mississippi river, for interest on the deficit alone. How long can we sustain this? I submit that we must, must come to reality .

Now let me comment on the trade deficit. I will paint just a few highlights to point out the severity. We've has a $500 billion trade deficit with the Japanese over the last ten years--an average of $50 billion a year. That is a massive transfer of wealth from one country to another. Unprecedented in the history of international trading. If you use the Department of Commerce's own numbers on jobs, they are proud of the fact, they're talking about the fact for every $1 billion in exports, 20,000 jobs are created. Now again if you assume we're at a $60 billion trade deficit, that's 1.2 million jobs represented by that trade deficit with the Japanese alone, and of course we're building up trade deficits with many other countries as well.

There are systemic differences between the two countries. The Japanese system of competition and trade is geared to cause the producers to be the winners, even at the expense of the consumer. Whereas in this country, we think of our government as being there to protect the consumer against the business. We have an adversarial relationship with business. I submit we ought to meet somewhere in the middle. We in this country need to have a better sense of partnership, and in Japan they need to have a better balance between producer and consumer and they need to open up their markets. We spend a lot of time working on just those things.

Let's look at education. Our biggest problem of all centers on education. Unless we get our arms around that problem, we are destined to fail. We are destined to be mediocre. I submit we dare not allow that to happen. Let me spend a minute on the nature of the problem. At least 20% of our people are totally, functionally illiterate. That is the same, by the way, as it was in 1851 when the Crystal Palace opened in London and we sent our representatives over to London to demonstrate our wares. We had an 80% literacy rate then. It was the highest in the world. That included the slaves, of whom only one out of ten could read and write. By the way, 1851 was the same year that we first beat the Brits in sailboat racing, and of course that is known today as the America's Cup. That, to them, was like Sputnik was to us. It got them interested in looking at this young upstart nation to see why it was so successful. The answer pointed at universal education.

Other literacy rates around the world at that time were 30-60% maximum, with most of Europe being 30-50%. The rest of the world has passed us by. Other countries now have rates of 98-99%. Let me pick out a few. The former Soviet Union is 99%. Korea is 98%. Japan is 99%. Western and Northern Europe is 99%. We are still at 80% - a fifth of our people. A recent Department of Education study is even more astonishing. It found 47% of our adult population is to some degree functionally impaired because of their relative inability to read and write. Forty percent of our 18 year-olds cannot draw inferences from a written page. Eighty percent cannot write understandable essays. Eighty-eight percent cannot consistently place fractions in order of size.

We are dead last in the world in math and science among 17 industrialized nations, on average, with our 18-year-olds, dead last. And what about our top 10%? They're the best, right? Wrong! They are dead last when compared with the top 10% of the same 17 industrialized countries of the world. Hungary, by the way is 16th, just for comparative purposes. Is it any wonder we are in a time warp. The fact is we have an agrarian system. Why do we not go to school in the summer? In Japan, children go to school 240 days a year, compared with our 180. They go to school four years more by the time they graduate from high school as a result. Our kids on average, have watched 22,000 hours of television by the time they graduate from high school and spent 11,000 hours in the classroom. I think that is telling. We spend twice per capita what most countries do on education, so spending is not the problem . We have vast bureaucracies, we've conferred monopolies--just what we said was wrong with the Soviet Union. So we've got to change that as well.

Moreover, as we look beyond our borders to the world at large, we see equally ominous clouds. For example, environmental problems that portend dire consequences for our entire planet. Poverty and starvation commonplace, human rights flagrantly abused by repressive governments. For example, just four out of 45 black-led African countries enjoy non-repressive governments. National ethnic and religious wars and the atrocities that attend, central and eastern Europe on the razor's edge in their struggle for transformation. Forty percent of the population of the world in China and India in various states of unpredictability. Deepening

recessions in Europe and Japan, a global trading system that is dangerously close to being so far out of balance that it will come crashing down of its own weight. The proliferation around the world of high-tech weaponry, including ballistic missiles and nuclear capability, and the unimaginable tolls that AIDS is leaving in its deadly wake.

Just as America's social and economic problems are interconnected so also are these kinds of problems connected nation to nation, around the globe. We cannot escape interconnectivity or interdependence and, moreover, we shouldn't try. For it is as important for us to manage change around the globe as it is to manage change here at home. I dwell on all of this because of the importance of its implications to the country, to business and government in general, and to the DoD and its suppliers in particular. This is the environment that will be driving policies and practices. If we're going to stop the slide, one absolutely vital ingredient will be for us as a nation to do more with less. This, of course, also means we must do what we do differently. Indeed, in many cases, vastly differently. It means breaking the molds, changing the paradigms, being far more innovative and far more creative. Our governments must get their act together. And I say "governments" because I mean at all levels. We have the same kinds of budgetary problems at every level in this country.

Business, of course, has to get its act together and it has been trying. It is making progress. Indeed, all institutions and organizations are, and will continue to be, deeply affected by all of this. The corporate and government graveyards will be littered with the corpses of those institutions that don't understand and effectively implement the sort of transformational changes required to succeed in this new environment.

All of this virtually demands that we establish an over-arching national agenda addressing these problems that is comprehensive, affordable, credible, and of course, totally integrated. We've not had a national agenda like that in my lifetime. At least if we've had, I'd like to hear about it, because I haven't thus far.

We've had government by segment, government by special interest groups, and we have had no over-arching national strategic plan that is driving us. No company would dream of doing that. If a company did attempt it, it would be out of business in a very short period of time.

Now President Clinton is, thankfully, causing us to address many of these issues. I still believe we're tinkering at the margin, and we're not making the kind of transformational change in over-arching ways that we must. But directionally, at least, we are beginning to focus on some of the critical issues. Such a national agenda and policies that flow from it, of course, would recognize that national security and economic security are also inextricably bound together. We cannot and should not try to separate them. We simply cannot for long have one without the other.

Then, of course, we ought to have a well-defined defense policy that complements our other goals. We must have the strongest, most technologically advanced military system in the world. But we cannot have that without economic strength; so they are bound together. Ideally then, strategies should flow from these policies; key goals should flow from the strategies, and implementation plans naturally should flow from the goals. Indeed, that would be the essence of a flow chart used to define roles and key tasks for the government and in particular for purposes here today, for the military as well. Indeed for every function, every segment, every sector of the DoD.

I know, of course, that you have been more than a little hampered, as we have been, in your efforts to define such roles and tasks because of the fuzziness of overall defense policies and because of the practices that were required by a mish-mash of rules, laws and regulations. Now in fact, if clearer, well-defined, affordable and comprehensive defense policies have regularly existed in this country over the past 20 years, then I'm not aware of those either. But don't let that bother you too much, for we haven't had such policies in such critically important matters as space, technology, education, trade, competitiveness, and the list again could go on. I know that the current DoD is working hard to develop just such a policy, and let's hope that effort will be successful.

There's a lot of talk in all of this about defense conversion and perhaps rightly so. But I believe the more critical focus ought to be on defense preservation, and I've had long talks with Bill Perry about this. We are not going out of the business of defense. Indeed, the world is more threatening today than ever in a broader set of ways. Let me give you my estimates. Proliferation, of course, is occurring at a much more rapid rate, as many of you know, today than it was when the Iron Curtain was still in place. Because technology is being sold, equipment is being sold, the people who developed those technologies and weapons are selling themselves often to the highest bidder. So it is our best guess that within the next dozen years, say by the year 2005, maybe 2010, 12 to 17 countries that do not now have the capability will have ballistic missile capability. Five

to seven of those that do not have the capability will have nuclear warhead capabilities. You don't have to be a rocket scientist to figure out that there are going to be some crazies out there, that have both intercontinental ballistic missile capability and nuclear warhead capability. If that's the case, then by definition, the world, Europe and Japan and others including the U.S., is going to want to have overhead systems that monitor and detect, and systems that knock out an unfriendly launch over the territory of the sender, not the receiver, because you want the nuclear fallout to be on the sender. That alone is a deterrent.

So we're not going out of the business of defense. What I fear most is that in the meantime we will lose the capability to produce those systems. Once lost, it is extremely hard to put it back together. So my point is, let's not worry so much about defense conversion. Let the weak sisters die a dignified death. Don't support the weak sisters who couldn't cut it in any but a robust defense environment, because they twitter it away if they couldn't make it as king of the hill in defense. They certainly aren't going to make it in the commercial world. So give it to the centers of strength so that we maintain those centers of excellence. That is not the conventional wisdom at the moment. I hope you can help us with all of that.

Another concern, while budgets are being reduced, in some cases dramatically for the private sector, is the level of work in many, not all, national labs, depots and federally funded R&D centers, in many cases is staying constant, and in some cases, even increasing. What ought to be taking place instead is an effort to be sure that we are striking a healthy balance between work in government and work in the private sector. It is essential that both remain healthy and strong, of course, but let's make certain that it is in balance.

Now, let me spend a few minutes on implications for the DoD in all of this. However well defined our policies may be, the implications for the DoD and its many segments, I think, are pretty clear. In the DoD, you have to do more with less. You've got to streamline yourself and be quicker and more agile than in the past. In short, you've got to do what U.S. business has been and is doing to become competitive in global markets. Now I don't pretend to have all of the answers as to how to do that, but in our limited time here I can offer a few thoughts about lessons learned in the private sector that may be useful.

As I've said, I believe that the DoD organizationally must seek strategic transformation. For our purposes here, I'll put the lessons learned in the form of what I call organizational principles or characteristics. So what characteristics do I think that you should strive for? There's one over-arching principle that has to do with a results or output orientation versus a process or input orientation. We dwell on the results, not the input. Minimize the layers, have a minimum number of layers; minimize the bureaucratic fat; minimize the time and attention spent on processes and procedure. Have an internal environment that is superior. What do I mean by that? You can use descriptive adjectives the way I can. You must have good, effective, two-way communication, honesty, trust, sensitivity. Those are the kinds of worlds that ought to characterize the internal environment. Cycle times. Cycle time is critical. Time is, in fact, money and we all have to reduce the time it takes us to do every task. We all know that particularly in procurement far too much time and therefore far too much money is involved. Indeed, what I like to focus on are transaction costs. That is to say the costs that are prolific in the tangential that is being acquired. A Carnegie Commission study indicated that 40 percent of the costs in defense procurement are attributable to these tangential overhead kinds of transaction costs. That's compared with 5 to 15 percent in the private sector. Decentralization, empowerment, we all know that's the wave of the future.

More effective education and training, more partnering relationships with contractors, truly win-win situations; not adversarial, TQM, continuous improvement, total quality management--those are buzz words but they all mean the same. Let's do every day our task with a more cost-effective approach. One that values and promotes dual use. We cannot afford any longer to have single-use technology, one relying on goals with metrics. If you can't measure it, you can't manage it. Defect-free manufacturing processes, utilizing the best technology to achieve our goals. Have, and this is of critical importance, value-based purchasing. I define value as that particular combination of cost and quality that best meets the needs of the customer. All too often, we do not focus on value. Our system is characterized by value-added. If you don't have value, you don't need the individual or the task. So each task and each individual must be measured by terms of a value-added test.

An organization having a healthy degree of professional impatience. Some tension, some frustration over the speed and magnitude of change. One that encourages breaking glass. I tell my people that "if I don't occasionally hear the sound of breaking glass, you're probably not doing your job. Now, if all I hear is the

roar of broken glass, you're probably overdoing it." But allow people and encourage them to break glass.

If you do all this, you can attract good people and you can be highly cost effective in carrying out your functions. We have to do the obvious things like consolidating functions, sharing facilities, ranges and the sort, but you'll hear a lot about that. This is an enormous kind of transformational change that we're talking about. It's a daunting task and the danger is that we'll tire or despair of it. But I'll leave you with the thoughts of that great philosopher Casey Stengel, who said, "They say it can't be done, but sometimes it doesn't always work out that way." And with that, I'd be happy to entertain any questions from the floor.

QUESTION: I'm Pam Hess from Inside the Pentagon. From an industry perspective of the different acquisition reform bills on the hill, are there any that go too far or don't go far enough, particularly 1587? Is there anything additionally you'd like to see in it?

MR.GORMAN: I think my own sense is that Bill Perry's plan that was submitted in February to Congress, contains most of the critical agreements for the kind of transformational change that I'm talking about. Even if enacted in its entirety, which is unlikely, it alone is not going to guarantee change. We have to have the kind of cultural change that I was talking about earlier. That is the single most critical element. All that any bill can do is help enable, help create an environment in which that kind of cultural change can occur. So we must have not only the enabling legislation, but also systemic change and cultural change throughout all of the industries - the DoD and its suppliers.

QUESTION: I'm Stephanie Kenny from the State Department. - You spoke about the importance of changing attitudes between and among representatives of government and industry. I was wondering if you had identified any particular mechanisms or processes that are not currently available that you thought could be created to help contribute to such changing of attitudes and building greater confidence and cooperation between the private and public sectors?

MR. GORMAN: Well, first of all, the tone is set at the top. You've got to have strong leadership. I characterize leadership as the ability to engage a group of people in a certain task and cause that task to be implemented. Leadership of that kind actually expands the capacity of the group being led. If you have that kind of leadership and the leadership is focused truly on change, then it will happen. But you have to have the kind of organization that has the characteristics that I briefly ticked off there. Those characteristics normally do not exist in either the public or private sector in our institutions. So indeed, it is a major cultural shift. It has to be led from the top, and the training and guidance and empowerment and delegation are all critical.

QUESTION: I'm Dave Gillette from ICAF. It seems like most of the trends we see are going the other direction. The DoD IG is on the increase, the number of auditors is the only growth agency in DoD, so is there any evidence that is turning in the right direction?

MR. GORMAN: I see no evidence that it is turning in the right direction, other than the fact that Bill Perry understands all of this better than anybody who's occupied that job in a long time. Now again, whether he can cause that understanding to lead to the kind of transformational change that's required, I don't know. It's a daunting task, but we can't leave it in the too-hard box forever. We've got to address it. We've all known for a long time how serious the problem is, yet somehow we all end up saying the environment is wrong. We can't get it past the hill in terms of enabling legislation. There's an awful lot that can be done without any change in the law. Enormous changes could take place. They're as much the result of practices in culture as they are of regulation and the law. We've all got to work together arm in arm in a win-win partnership manner. That's the only way that it will ultimately occur. But if we don't get our act together in this dimension, along with all the other problems that I've talked about, we'll continue to slide downhill relative to others. Again, I've mentioned I voted for George Bush. I worked with President Clinton. We have only one president at a time, and fortunately, he seeks our advice and counsel. I've said to him that I believe we can do all that we're now doing with 30 percent less money. If you believe the 40 percent that I talked about a minute ago, or my 30 percent number, whatever it is, it's huge. But we have to change the way we do things dramatically if we are going to achieve that.

QUESTION: I'm A.J. Boureguard from Lockheed. Some who are in your position have said that the only reason the change you speak about ever takes place is when you either have fallen or your corporation has become part of another organization--that's the only thing that ever works universally. Would you be candid with us about how you really feel the change would take place and what you would see as a way to rebuild afterwards?

MR. GORMAN: I tried to build the case today for the fact that we are in a crisis, when you take the aggregate of our problems. What I'm trying to do is cause more people to understand that we are in a crisis--and

if we're not in one, at least it will do until a real one comes along. I happen to agree with you that organizations tend not to change transformationally, at least absent of crisis. The body politic in this country tends to call for transformational change only when it perceives crisis. That, I submit, is what happened in the election. People didn't vote for Bill Clinton; they voted against the status quo. They really didn't vote against George Bush; they voted against the status quo.

I talked about that 80 percent believing we're a nation seriously off track. They don't understand all the details of why we're off track, but gut feel notionally. There's a lot of sense of that. It's true of the public perception of all institutions. Let's just take a minute to dwell on that. We as a people have lost faith in our institutions. We've lost confidence in our institutions, and that's true of government--we don't have to take polls of Congress to understand that. It's true of business and of Wall Street. Look at scandals on Wall Street. We've had scandals in every institution--the military, the CIA- more than our share there- Wall Street, religious institutions with priests as pedophiles, United Way national organization, universities, including Stanford and others involved in some scandalous type of activities. You name the institution--baseball, other sports--and you see scandals. Is it any wonder, therefore, that people have lost faith in our institutions? So I'm urging a kind of transformational change in all of our institutions. Let's view ourselves as being a quasi-public institution and act ethically in matters that are consistent with public trust. We all ought to change the way we operate in that dimension so that we can regain the confidence and trust of our constituents. And, by the way, this is true all over the world, not just in the U.S. You look at what's happening in Japan in terms of their political and economic reform. They know they need it. The people, in effect, have said they want it with their vote. Yet scandal after scandal has left the government virtually powerless to do anything about it,and indeed the rest of their institutions. Again, around the world you see that happening. So we have a serious, serious problem. If we can communicate effectively the extent of that problem, I think the people will have the good sense to stand up and demand change.

QUESTION: I'm Jim Warrington from the Chemical and Biological Defense Command. You talked about focusing on defense preservation as opposed to defense conversion. My question is, how about those very small companies that have carved a niche in military unique items, yet they're run very efficiently? What would you propose in that arena?

MR. GORMAN: First of all, we are not going out of the business of defense, as I said. The best will survive and should survive, large or small. In the private sector, there are fewer and fewer first-tier suppliers. That doesn't mean there won't be second-tier and third-tier and fourth-tier suppliers. Take the automotive industry. It used to be that General Motors had 6,000 suppliers. They're now down to about 3,000. The Japanese like to operate at about 300. The new Chrysler Neon was developed with 300 suppliers. Now, that doesn't mean there aren't many more firms producing products that go into the Neon. It means that there are fewer first-tier suppliers. Those smaller, specialized firms in many cases are serving as a supplier to a first-tier supplier. Now that kind of thing can happen in the government, and I suspect it will increasingly happen in government procurement.

QUESTION: This is Walter Greenfield from ICAF. You mentioned the problems with education and the role the United States has played in promoting universal education. I think universal is a good word for it because we have 50 states and numerous counties and cities that are basically responsible for the education system. I wonder if you could share with us your idea of how we get a handle on education, given all the diversity and the differences in the people who can afford and cannot afford a good education system and the role that many businesses might play on this.

MR. GORMAN: I am delighted you asked. My job with the national Business Roundtable is to have 50 CEOs in each of the 50 states helping to lead a coalition to bring about systemic change in our school systems in every state. It requires legislation at the state level in every state, as you suggest. We have those efforts currently under way. We are making progress, significant progress, in about eight states. Kentucky has enacted comprehensive legislation and, in fact, has made many changes as a result of it, and the results are improving.

The Alabama school system has been declared unconstitutional by the Supreme Court of Alabama. So they are heavily under way working on this, as you might guess.

But we are working it. It is a difficult task. We have made a 10-year commitment, 200 companies, 10-year commitments. CEOs can come and go, but the companies will continue to work hard with broad-banded, broad-based coalitions in every single state.

Thank you. I have appreciated my time with you. I hope that as you heard what I had to say, something here or there struck a resonant chord and you will go

back and make a difference in some way in connection with these problems. Thank you.

RADM SMITH: That is the old TV program. The A-Team used to say, "I love it when a plan comes together." We are fortunate in getting Admiral Bill Owens here en route from the Capitol back to the Pentagon. He is going to give us about 35 minutes of carefully scheduled time, or I am going to get killed by his entourage. Admiral Owens, as you know, is our new Vice Chairman of the Joint Chiefs of Staff and the nation's second ranking military officer. In Navy operational sense he has commanded at every level, an attack submarine, ballistic missile submarine, a sub squadron, a submarine group, and the United States Sixth Fleet, which is also the NATO Striking Force, Southern Europe.

In his shore-based tours he has taken the time to be the Senior Military Assistant to the Secretary of Defense. In his last job he helped Admiral Kelso reorganize the Navy staff in the resources area serving as the First Deputy Chief of Naval Operations for Resources, Warfare Requirements and Assessments. He is a graduate of the Naval Academy, the father of a midshipman at the Naval Academy, and also has his BA and MA degrees in politics, philosophy and economics from Oxford University where he was a Rhodes scholar.

We are delighted to welcome again to this symposium the Vice Chairman of the Joint Chiefs of Staff and for the first time Admiral Bill Owens to this podium.

REMARKS OF ADMIRAL WILLIAM A. OWENS VICE CHAIRMAN OF THE JOINT CHIEFS OF STAFF

ADMIRAL OWENS: It is very nice to be with you this morning. We are faced with many, many issues at the Pentagon today. I am sure you noticed that, and I will try to run through just a few of them with you this morning.

I was up in Grand Rapids, Michigan recently, and while I was up there giving a couple of speeches I stopped by the Veterans Hospital and talked to a group of elderly gentlemen. I think the average age in the room was 80 or 85 years. Most of them were not in very good shape, with many in wheelchairs.

I was telling them about how proud I was and how proud I thought they would be of the American men and women in the military today. I said I was particularly proud of the soldiers, sailors, airmen and marines. One of the old gentlemen said, "How about me, I'm in the Coast Guard. You didn't mention the Coast Guard."

I said, "Gee, I'm really sorry, sir. Of course I meant the Coast Guard, too."

There were 700 patients in this hospital, and I said, "How many Coast Guardsmen are there at the hospital?"

And he said, "I'm the only one."

The guy sitting next to him said, "How about me? I'm in the Coast Guard too."

He looked over at him and he said, "Really," and they started this little conversation. And the guy looked up at me and said, "Well, at least something good came out of this." Which gives you a taste of what you are about to hear this morning.

There has been a revolution in the world. You have all seen it. It is really out there, it is for real. Things have really changed out in the world. I was the Sixth Fleet Commander during a time when the Iron Curtain came down; when the relationships changed in Europe; when we fought a war in Desert Storm; when we fed people in Northern Iraq and Southern Turkey, the Kurdish people; and a time when we did operations like dropping concrete blocks in the top of volcanoes to stop the volcano flow from coming down to engulf a small Sicilian town. I mean, these are different times.

I remember, in particular, a voyage of the Kusnetsov. Kusnetsov was a proud aircraft carrier that the Soviet Union had planned and built in the Black Sea. The ship was finally nearing completion about the time that the Iron Curtain came down. You recall the dispute which continues today about the Soviet Black Sea Fleet and who gets it, the Ukrainians or the Russians.

At this particular time, the appearance apparently was that the Ukrainians might claim this aircraft carrier. This was going to be a super carrier, not quite as big as our carriers in our Navy, but it was going to be a respectable ship with lots of conventional aircraft, fixed-wing aircraft capability.

A lot of money had been devoted to this ship, and now it looked like the Russians needed to get that ship out of the Ukraine. So they sailed her from the Black Sea and she came through the Bosporus. We started to trail Kusnetsov. We fell in behind on the stern and started the trek across the Mediterranean.

Soon there was a French destroyer and then there was a Spanish destroyer and then there was an Italian

destroyer, and pretty soon there was Kusnetsov and her little gang of ships going across the Mediterranean.

We started to develop a real relationship with this ship. The Captain and the Admiral on the ship were conversant, and we sent them messages and they sent us bottles of vodka. We eventually got to the point where when the Kusnetsov was going to turn, they would raise a flag hoist—corpen 9 means turn 90 degrees. So the Kusnetsov would raise the flag hoist and we would all turn 90 degrees.

One of the striking things about Kusnetsov was that this was not the proud ship we had seen during the years of the Soviet Union's existence. We had become familiar with Soviet ships that were deployed bristling with weapons, freshly painted, sailors sparkling, standing on the rails. This was not that kind of ship.

This was a ship that was rusty. There was canvas over the weapons systems. Dogs were running on the main deck of the ship. There were families on board the ship. You could see women and children on the deck of the ship. This was definitely a different kind of major warship from what we had seen in the past.

When the ship got to the Straits of Gibraltar, I sent a message to the Admiral on board Kusnetsov and I wished him fair winds and following seas and a good return home. He sent me a message back saying that he didn't know where home was. You know, the world really has changed out there.

There are lots of anecdotes. We can all tell you these stories. But it struck me that the world is not the same out there and we have to respond to it. We live in a bureaucracy of requirements, of acquisition, of democratic processes, and it doesn't move very quickly.

So if the world has had a revolution, how do you grab hold of this thing and shift it in a new direction. Not just shifting the rudder a couple of degrees, but grabbing hold of the whole thing and shifting it in a new direction.

There is another revolution. The budget is a revolution. For us in defense acquisition and those of us who deal with how to manage the military today, the challenges are enormous. As you look at the defense budget from the end of the 80's to the end of the 90's, the real program is down by 50 percent. It is an enormous amount of money.

If you were the CEO of TRW and you were told that your total budget was down 50 percent and you could only change your fixed costs by 15 or 20 percent, you would worry a lot about your tooth-to-tail ratio, about your ability to develop a profit line. That is the situation we face today.

As the budget goes down quickly, and the peace dividend is reaped, we note that we are unable to take down the infrastructure very fast. Our base structure, which we would like very much to take down by 50 percent, also doesn't come down as quickly.

So we have had a BRAC I, '91 and a '93 base realignment and closure, and now we hope '95 so that we can clean out some infrastructure. But even if we are perfect in this, we might get about 30 or 31 percent of the total infrastructure, maybe.

If the budget goes down 50 percent and you get rid of 30 percent of fixed costs, the tooth-to-tail ratio, even in that optimal situation, doesn't look as good as it did before. So we are trying to deal with this. We are trying to deal with acquisition reform, a new way of looking at requirements, fitting out the infrastructure.

And importantly, General Shalikashvili and I have been spending a lot of time trying to look at jointness. What does it really need and do we really understand how we bring the four services together in new ways? Both because it is better from a war-fighting perspective, but also because it is more efficient in the face of this downsizing budget.

The question then is how do we respond to these two revolutions that have taken place in the world, one a sort of geopolitical one and the other budgetary. Both of which we salute and say it's great. On the other hand, the management challenges of getting us through this period of time are absolutely enormous.

The costs of downsizing are enormous. It costs money to downsize. It costs money to shut down a base, to move facilities from one base to the other. If you want to downsize the U.S. Army by 200,000 people, this is an all volunteer force, so you have to pay them to leave because they want to stay. You have to pay them something called SSB, VSI SSB, a bonus paid so that they will leave.

I never thought we would be paying people to leave the service, but that is what is going on today as we attempt to downsize, and it is a part of the cost of downsizing. So this next four or five years is going to be enormously important as we try to manage ourselves down to the right sized force.

At the same time, the world seems to be a much more dangerous place, in some ways, than it did before. There are mornings when you wish for the old Cold War environment where you knew exactly what you were doing. You could trim it a little on the edge, the budget, the policies.

Today you wake up and you are wondering if you are at war in Gorazde or what is happening in Kigali.

Where is Kigali? Few people knew just three or four weeks ago, until tens of thousands of people died in the country of Rwanda. How do we respond to that?

It is a very interesting new world.

And then how about Iraq? We are still there, in Northern Iraq, flying no-fly mission over the area north of 36^0. And in Southern Iraq, making sure that Saddam Hussein doesn't fly missions in Iraq south of 32^0.

We still have ships in the Gulf of Acaba that are there and have been there since the end of Desert Storm preventing contraband from coming up into the Gulf of Acaba. So the whole world looks very different now. We must react to these new missions and challenges. We have to ask ourselves what kinds of systems, what kinds of programs do we want to develop as we look at this new world. So that is our challenge.

Let's go back to the jointness issue one more time, General Shalikashvili feels quite strongly and has worked a lot with General Cerjan and with me to try to figure out how we should look at this new jointness.

Is it real? Do we really in the Navy, the Army, the Air Force and the Marines talk to each other? If you have a Navy airplane that does electronic warfare like the ES-3, does it talk to the Army battlefield and to the Air Force fighter pilot and to the National Sensor in the sky?

The answer is maybe. We don't know. So we have to look through all of the details of these interconnections because if information management is important, and I really believe it is, then that is a key to bringing us together jointly. If you know where every vehicle is on a battlefield 200 by 200 miles, then the problem of putting a weapon on those vehicles tends to be a lot easier than it does if you don't know where they are.

So knowing where they are and then communicating that information to put a precision weapon to put on the target is the sort of challenge of the new war, anti-war sort of environment we face today.

And it is exploding. If you look at what has happened in our inventory since Desert Storm, you would be amazed. I am. The data rate that is possible out of an Army ASAS system is something like 20 times the data rate as that during Desert Storm.

The data rate that is possible from every one of the carriers is over 8 times greater than what it was during Desert Storm. Look at the ability of Naval aircraft to use precision weapons. All of the F-18s, about 500 of them flying from the decks of carriers today, can use precision-guided weapons to put a weapon on target. During Desert Storm none could. It is a big change, 500 aircraft that now have that ability like the Air Force had during Desert Storm. It is an added capability that is very important.

The Tomahawk BLOC 3 and BLOC 4 are significantly better than the Tomahawks that were used during Desert Storm. You may recall they flew down the main street of Baghdad, four or five of them in a row. If you didn't get the first one, then wait until the second one and shoot it down. Not anymore. They fly in by GPS using various flight paths. It is a much more reliable and accurate weapon.

These kinds of changes, as well as changes in the battlefield, like the short-range UAV, the Hellfire 2 Missile, and the TOW 2B Missile, all make a tremendous difference in our capability. And this has all happened since Desert Storm.

We talk a lot about how much force is enough. The bottom-up review looked at that and said two major regional conflicts (MRCs) is the name of the game along with an ability to provide an overseas presence that is credible in this new world. And that force was sized for that. It was a pretty good effort.

I think the bottom-up review was a genuine effort to bring together a meaningful force structure for this new world. We stand behind it. Not because we are told to do so by our political leadership, but because we think it is important.

So the question is: Well, Admiral, how can you justify that you needed seven divisions in Desert Storm? If you are going do two MRCs, then two times seven is fourteen. How are you are going down to ten active divisions in the Army?

The answer is really twofold. One is that the bottom-up review is focused on the end of the century. The Army is not at ten divisions right now, it is at twelve divisions, and a lot of weapons have come on line as we progress through the rest of this century. So the likelihood that we will do a little better than we did in 1991 and '92 is very good because our technical ability has gone way up.

At the same time, we think there is some degree of risk. We were never satisfied during the Cold War that we had the ability to absolutely mop up the Soviet divisions in the central front. There was always an element of risk. Likewise, there is moderate risk in the bottom-up review force.

I think it is wrong to back away from two MRCs and build a new strategy around one MRC. I believe the BUR, 2 MRC force structure is right for this new world. But we must identify the risks. I think with General Shalikashvili's new movement in areas like, joint doctrine and joint war fighting, we will come a long

way toward doing that.

Most important of all is to maintain our readiness as we go through this difficult period. I am not going to say much about this except I believe it is mostly on the line with respect to our people.

We must be able to take good care of our people as we go through this period. Tthat means pay and benefits, medical and retirement systems. Unless we do, we start to erode the basis which is the true meaning of readiness, these fine young people we have in our military today.

I wanted to portray all of this as a sort of collage of how it feels today. I also want to talk with you avout acquisition and how we are looking very carefully at what we need to buy. Because it is not enough to say there is a revolution out there, the budget is going down, and we have a bottom-up review that provided for two MRCs and the forces for two MRCs. That is not enough.

You have to then say what is the capability that this will represent. And, of course, the devil is in the details as you look at all the systems inside those carrier battle groups, those tactical fighter wings, those Army active divisions, the Army reserve divisions, *et cetera*.

What we have decided to do is institute a new process through the JROC, the Joint Requirements Oversight Council, a group that I chair. It is a four-star group on which the Vice Chiefs of each of the services sit, and we conduct joint war-fighting assessments.

We will spend a lot of time on this, and it will not be an O-5, 0-6, Lt. Colonel, Colonel, maybe Captain kind of drill. It will be a four-star drill that looks at what is the need for joint war- fighting forces across mission areas.

So, for example, we will look at joint strike surveillance reconnaissance,intelligence, the mobile battle field, information warfare, strategic lift and its protection. Ten areas like this that allow us to have a crosswarfare assessment to judge where we are going in a joint environment and make sure those links are there. So we can make sure that the lift is there, or that things are accomplished efficiently. Maybe we will find redundancies. Or maybe we will find areas that are not presently filled, vacuums, a data link that is necessary to connect that ASAS with that Navy airplane.

Our goal here is to be aware enough of the details to understand our joint war-fighting capability to allow the Chairman of the Joint Chiefs to produce a joint war-fighting capabilities assessment for use in the budgeting process.

We think this is important because if we don't do it, who will? Can we expect our civilians in OSD to understand the details of these war-fighting systems and tie them together in a way that allows decisions to be made accross the services? Do we think that the Navy programmer who works hard putting together the Navy budget understands what those funny little rectangles are with little oblong circles and x's on top of them? Do we really think he even knows what that designator is?

Do we expect the services to do it? I don't think they can. It is a strange thing in our system that we procure joint war-fighting capability in four stovepipes, the Army, the Navy, the Air Force, and the Marines. Those guys and ladies do as well as they can to do that, but they don't do it as jointly as we would like.

I am not criticizing the services, but we think it is necessary to provide an assessment of how we can do this better together. So the Vice Chiefs of the services and Iwill bring to the Chairman of the Joint Chiefs a Chairman's program assessment, which is required. This assessment will give him and the Secretary of Defense a new view, perhaps some insights into how our forces are built and what their capabilities are.

At the same time we will try to build the links with the unified commands. This is extremely important not only to gleen from their wisdom but to be able to say that we are together with the unified CINCs. So General Joulwan in Europe, General Hoar and General Downing down in Tampa, or Admiral Larson in the Pacific, and General McCaffrey down in Panama, the five regional CINCs, will provide their inputs so that we understand their regions and their requirements as we build our joint programs.

To do that we will have a day-to-day, week-to-week data exchange between us. Every few months I and the JROC will get on an airplane and go out to their theater and talk to them about our ideas for joint war-fighting. That means the joint war-fighting and joint doctrine and developments put together in Washingtonwill have inputs from the CINCs as we build this program for the Chairman.

Now, this doesn't mean that we are going to get into the services programming and budgeting business. It does mean that we will try to understand what is going on in the services, and it will allow the Joint Chiefs and the Chairman to have an ability to evaluate these programs jointly.

Another Sixth Fleet story, if I may. Our first visit to Varna, Bulgaria was the first time an American delegation had officially been in Bulgaria after the Cold War ended. The ship, the Belnap Sixth Fleet flagship, had pulled into the pier in Varna. The Captain and I were

coming down the brow. As we walked down the brow to the pier, out of the corners of our eyes we saw an elderly Bulgarian man with his hand on the side of the flagship. He was another one of these 80 or 85 year olds. Through an interpreter, the Captain asked the old gentleman what he was doing to his ship. The old gentleman looked at him and said, "I've been waiting 45 years for the Americans to come." He said, "I've lost hundreds of comrades waiting for this day, and I wanted to savor this moment for them." I thought what a remarkable thing. That is what it is all about, isn't it?

I thank you very much for listening to me this morning. I would be happy to answer a few questions. I promise to acknowledge the Coast Guard.

MR. FARNSWORTH: I am Scott Farnsworth from DSMC. When you participated in some of the reorganization within the Pentagon and the Navy, it was to move the Navy away from their internal budget battles by platform or focus. You have kind of given us an example today that their is a renewed focus within the JROC, to look at jointness.

Can you give us any examples of where that is actually--I mean, certainly that was the mission of the JROC, but you have added an emphasis saying that it is really the mission of the JROC now. Are there some examples that you can share with us where jointness is going to help us get away from these service against service requirements or battles for the budget?

ADMIRAL OWENS: Well, we have to be careful, I think, Scott, to preserve the traditions of the four services. So it is a little bit different situation here than it was with what we tried to do in the Navy. This has been a real education in the Navy in the last couple of years, as you know, and I won't go into the details of that.

But it has changed enormously the direction in which the U.S. Navy is going. A lot of money shifted around. Billions of dollars shifted as a result of the directions that have been taken in the Navy. Here I think our thrust would be to say we don't really know where this is going to go.

General Shalikashvili and I genuinely want to look across the services favoring no particular service, but making sure that we genuinely have a joint capability. So yesterday there was a JROC meeting, and we talked about horizontally linking tactical intelligence systems. There are processes that are in place today, if you are building a new UAV for example, that says before you can get approval to produce it you must show that it is interlinked with the national systems and across the services in an architecture (JDIS, JWICS, local command and control system, *et cetera*).

But there are some systems where decisions have already been made to procure that do not meet this cross-link criteria. Systems like JSTARS, the Navy's new E-2C upgrades, the short-range UAV, and the AWACS upgrades.

There are dozens of systems which have already been through the acquisition decision process and have not had the requirement to inter-link and yet will be the basis for our reconnaissance, surveillance, intelligence on the battlefield, in the air and at sea for the rest of our lives. So we decided yesterday that we would get into these systems and review how these systems interface with each other.

You don't know how this all will play out. I don't know how it will play out. In the final analysis it may be that this kind of thing is very expensive, but at least we will make a conscious decision as to how we proceed as opposed to allowing the system to just plow on. So that is one example that we looked at yesterday.

I predict that in the next three or four weeks there will be a product that comes out of this that goes to the Chairman. I am a member of the Joint Chiefs, I can take it into the tank with the other service Chiefs.

We will make a decision as to what we are going to do to recommend to the Secretary of Defense who will then make a final decision as to whether we actually carry out the kinds of things that would be necessary to tie together these legacy systems. That is the kind of thing we are doing there.

But I wouldn't shy away from the even more significant things as we look at precision strike and the reconnaissance, surveillance, intelligence necessary to do it and what it means in the final analysis as we look at each of the services' roles in that mission area in how they fit together.

So this is going to be different. I will come back and talk to you next year about how successful it was. Or if I am not available it will tell you that I was not successful and that guy has gone back to North Dakota where he came from.

Thank you very much for listening to me this morning. I wish you all the very best. Thank you.

RADM SMITH: Thank you, Admiral Owens, for getting us started here. We really appreciate it. Well, we have had the appropriate setting for the tone of the conference with a vision from industry and a sense of the kind of forces that are at work within senior levels of the military and the civilian leadership in OSD. Now it is time to get down to the focus and the pay dirt of this symposium. And we move to the morning panel presentations and discussion entitled "Strategies for Re-

engineering the Acquisition System."

To chair this panel and to introduce the speakers is ICAF's own Dr. Linda Brandt. Linda has a Ph.D. in political science from the University of Colorado. And you say, "What is a political scientist doing running the acquisition course at the Industrial College?"

The answer is that Linda has over 17 years of experience in acquisition policy, public finance and budgeting, and an acquisition education in teaching. Her position is Professor of Acquisition, and she is the Director of the Acquisition Program at the Industrial College of the Armed Forces.

Dr. Brandt, we welcome you to the panel. Take charge and carry out your orders here.

PANEL ON " STRATEGIES FOR RE-ENGINEERING THE ACQUISITION SYSTEM"

DR. BRANDT: Our session is called, " Strategies for Re-engineering the Acquisition System." I can't think of four people who are better qualified to talk about that process and what is really happening in the field then our panel members today. They can tell you what is being discussed, and more importantly they can also tell you what is being done and what is being implemented.

They each bring a perspective that we understand if we are going to be re-engineering the process as a whole. We have a service perspective, we have an industry perspective, as well as an OSD perspective.

We talked a bit about being flexible before, and one of the things that we are going to be flexible with is Mrs. Preston, who is on the program. She is in the middle of working on an extremely important piece of acquisition reform legislation. We are very fortunate that she is going to be joining us, but she is going to be a bit late.

Let me tell you how the panel is going to be configured, and then I will briefly introduce the first speaker. Each of the speakers will speak for about 15 or 20 minutes from the podium or as they wander around, if they care to. After that there will be a brief stretch break in place, and we will raise the screen and we will have a panel discussion with questions from the floor, as well as discussion among the panelists when we begin.

Let me introduce our first speaker. Dr. Kenneth Oscar is the Principal Deputy for Acquisition, U.S. Army Materiel Command. If you looked at his bio you can see that he has very recently been appointed to that position.

I was kind of charmed when I met him in the Forrestal room this morning and he talked about coming into Washington to do really important work . However, he said that it was very difficult to leave his former activities because having been in a position with line responsibilities, it was like having one of the best toy shops in the world. If you visited any of his facilities, you know what he meant.

Dr. Oscar is a graduate of Clarkston University. He has a Masters of Science and a Doctorate degree in physics from American University. He was the Assistant Deputy Chief of Staff for Development, Engineering and Acquisition at Headquarters AMC, which is where that great toy shop is.

Prior to that he was the Associate Technical Director for Research and Development, U.S. Army Troop Support Command, and in addition has a long list of credits which are detailed in his bio. I am very pleased to welcome

Dr. Oscar to bring us a perspective from the field and Washington. With that, Dr. Oscar.

REMARKS OF DR. KENNETH J. OSCAR PRINCIPAL DEPUTY FOR ACQUISITION, AMC

DR. OSCAR: Thank you. Good morning. I am going to give you a summary of the strategies that the Army is using, right now today and for the last number of years, to conduct acquisition streamlining and make the process of buying our equipment better. I will then go through a couple of detailed examples, a few initiatives that are new and exciting, and then I will go through some of the early results of those initiatives and the payoffs that they have achieved.

Our challenge, of course, is to not only maintain but to transform the Army. I believe General Sullivan, Chief of Staff of the Army, has an excellent published vision strategy and plan to reform the Army and transform it from a deployed Army to a force projection

Army. He is moving the Army very rapidly in that direction. To do that, we must have an adequate industrial base as a partner, as we go about implementing our reforms and changing our way of doing acquisition business. We must maximize our buying power because we have less dollars with which we can enact these changes, which are very radical for the Army,in terms of new equipment, new organizations, new roles and missions. So we must get every little bit out of every dollar we do have.

Our strategy has two basic parts. I didn't coordinate this at all with Admiral Owens. I didn't know what he was going to say. But the first part is to take a look and optimize what it is we are buying. You have heard a lot about the details of how we procure things, but the first step is to look at what we are buying and how can we get the most force benefit on the battlefield for the least investment of dollars. I will go into that in a little detail.

Then once we figure out how to buy, what it is we want to buy, we need to look at how to change the mechanism and streamline how we buy it. I will go through some initiatives that we are doing now and that we do not have to wait for acquisition reform to implement. We have the power under 5000.1 to enact these changes today and we are doing it.

First let me talk about how we are going about figuring out what it is we want to buy to maximize those dollars. One of the things General Sullivan has done is go back and take a lesson from history and is re-enacting the Louisiana maneuvers which took place in 1941, which was the last tremendous change in the Army, going from 200,000 soldiers in less than a year to 2 million soldiers, training up with new equipment called tanks, getting rid of horses, and trying to figure out how to re-organize the Army, how to train the Army, and how to make the best use of that new technology. He had major maneuvers in Louisiana, Arkansas and Texas where he pitted one Army against another to train this Army and try out these different organizations. We are redoing that today, but rather than large armies on the ground, we are doing much of it through simulation, especially distributed interactive simulation.

One of the things that this then allows us to do, in trying to re-organize this Army now, is we are downsizing and completely changing it from an Army that was over 50 percent based overseas to an Army that will be 90 percent based in the United States. An Army which has to project anywhere and do missions such as peacekeeping, solving hurricane problems in Florida, resolving riot problems and drug problems, and assisting in Somalias and Bosnias. One that we can rapidly inject anywhere in the world.

We will again redo that organizational structure. We will figure out how to best utilize the battle labs to test, run small exercises, conduct larger war games, with both actual troops on the ground and using troop simulations, to restructure that Army.

The key to this is a process we call the virtual prototyping process. Let me try to describe the power of distributed interactive simulation and how it allows us to do business differently and how very shortly it will radically affect the way industry does business. I think we are on the verge of a new revolution that will bring about changes that are as fundamental as those that took place in the industrial revolution. Since the beginning of time, customers worked with artisans to design products. We then went to mass production techniques where we made everything the same so it was cheaper and people could afford it. Then we created vast advertising departments to convince you that is what you wanted.

Now, shortly, you will be able to go to a showroom at an automobile dealer, design your own car, have versatile companies around the world produce the parts, have them come together and deliver you that car, every one different, every one still cheap, within six weeks. General Motors has started doing that in small prototyping shops. We are doing that now with a virtual prototyping process in the Army where we are trying to go from concept to production in months instead of years.

I need to give you an example in real life of how this works to kind of show you the payoff. What we are doing is hooking up all of our models, every single model we have, and having them interact together. So what used to happen was, we would get a requirement, say, to make a 50-ton tank that had certain characteristics, shoot so far, go so fast. What would normally happen is that all your engineers would get together in a room under "concurrent engineering," and you would argue about the design features. The guy would want to put the engine in the front and the armor guy would say, "No, we have to put the engine in the back, we have to put armor in the front." And the center of gravity guy would say, "The center of gravity is all off." That would take maybe a year to work all that out. And then you would start into the detail design and the same thing always would happen. About a year into detail design because each one of these functional specialist, whether it is a transmission or a gun or fire control, is always pushing the state-of-the-art.

So you get this call in the middle of the night about three years later, perhaps from the engine guy. He says, "I got this little problem. Don't worry, it's nothing that about $10 million and another year won't solve." You are faced with either doing that or recycling and redesigning the vehicle. We have done that over and over again.

Finally, you nail it down, you build your prototype, in about four years you give it to the soldier to test. He tests that tank and he says, "Great tank, that's terrific. I would like you to make this one little change though." You say, "Sorry, sucker, it's too late, it costs too much now to change it."

In this new process, as soon as a requirement hits us, we can develop a solid model in a computer, of not one concept, but hundreds and hundreds of concepts. Each one in each component having a high risk or low risk or medium risk. We can play that interactively with the soldiers. We can essentially test it before we finish the detail design or before we even build it. Using distributed interactive simulation, what we have done is hook up all the training simulators in the Army. The difference is, if I have a simulator, like a flight simulator to teach you how to fly a plane or a soccer simulator to teach a person how to kick a ball, that is an individual trainer. When you hook them up together, you not only train the individual skill but you train the group skills. So if I am a soccer player, I can kick in the ball and he can receive it. So we learn and train as a team. In the Army I can wave to the guy in the tank next to me and he might be in California. The helicopter that swoops down and kills the enemy tank in front of me might be at Fort Rucker.

Every action affects every other action, and we learn to train, not only to drive the tanks but to fight as a unit. By pulling those simulators into our laboratories and factories, we can now test our concepts with real soldiers before we ever build our vehicles. We can test them over and over and over and optimize them. Prior to this, we built a prototype, tested it, fixed it, tested it, fixed it, and each cycle would take years. We now can test it with real soldiers and those cycles take days.

When we are finally done with that, as we are doing that design, we have automated and simulated every machine, every tool path, the whole factory layout, and we get the true concurrent engineering now, because as we design the tank, we design the factory. We can change the design to make it as low cost as possible on a factory floor and not give just it to the factory and say, "Well, make it now."

When we finally build it, we push the button and the machines, without Technical Data Packages (TDP's), without drawings, make the parts and we assemble it. Then instead of testing it--and we used to test every truck 3000 miles at Aberdeen and 3000 miles in Yuma in the desert and 3000 miles in Fort Greeley, Alaska--we now put in a motion bay platform and vibrate it and shake it and run it in all weather conditions 24 hours a day and then just go test it 300 miles to confirm it. We are saving all the way through the acquisition cycle, not just in the contracting process, with the goal of going from concept to production in months.

Finally, what we have found using this process is that we can modernize our equipment without buying new platforms, without buying new tanks and new helicopters and new planes and new howitzers. We can come up with strategies we call horizontal technology integration , which allows us to make quantum leaps in force capability. Things like second generation Forward Looking Infrared Radar (FLIR) across the battlefield or horizontal technology digitalization of the battlefield.

Let me describe digitalization of the battlefield, because a lot of people talk about digitalization. It has a tremendous payoff for a very low cost. If you picture Norman Schwartzkof directing Desert Storm, he has this big map up here and he has a grease pencil. And he is telling the guys, "You three divisions go this way, you two divisions are going to turn here, and the Navy, you float over here. This happens over here and we are going to attack."

They all copy it down, and they run out to their divisions and they tell them, "Okay. This battalion goes this way and this battalion follows." It all tiers down until it finally gets to a young armor captain who has ten tanks. He says, "Okay. Guys, here's what we are going to do. You are going to be the lead tank, you are going to be the wing man, you are going to follow behind, and here is what we are going to do. We are going to rendezvous at this point and the enemy, we think, is over there." They all jump in their tanks, gung ho, take off and get lost and spend all day long on a radio, "Where are we? Where is the enemy? What do you want me to do?"

Now, by putting a little black box in those vehicles-and we have done this at Fort Irwin, the National Training Center, and we have done it at Fort Knox- we can connect them together. This improved digitized capability upgrades the systems without the purchase of new tanks, helicopters or howitzers. Here is a new scenario.

The tank commander gives them the instructions with a light pencil on his cathode ray flight panel, it appears in every of the ten tanks, where they are, where

they need to go. It shows them where all the friendly forces are, it shows them where all the known enemy are. They jump in their tanks and take off and they know exactly where they are and where they are going. They don't waste gas, they don't hit trees, they don't get lost. The lead tank runs into a mine field. He zaps it with his laser designator. Eighteen kilometers behind the howitzers fire suppressor fire on the other side and smoke on the mine field. He plows through, he hits the four corners with his laser beam. Every single tank and helicopter and plane and ground troop sees where that cleared path is. The helicopter sees the enemy force. He laser designates it. It says enemy force. It appears in everybody's tank. The commander gives instructions to everybody on where to go, how to synchronize fire, and they all do it. This whole thing takes place in minutes with no one ever using the radio with voice communications.

The combat power, synergism and multiplication is phenomenal, and yet we didn't buy new helicopters or tanks. This is horizontal technology integration. By using this virtual prototyping process, by using Louisiana maneuvers, we can figure out how can we get the most leverage, through technology, on to the battlefield for the least cost.

Now, how do we streamline what it is we are going to buy? Obviously what we want to do is come down to the bottom of the cost curve. Many years ago, 50 years ago, we had a lesser degree of government regulations affecting the acquisition system. Bureaucracies were created and we put in rules and regulations to get rid of people giving the contract to their uncle. We have swung too far over to the side of over regulation and now many of those regulations are choking us. I said regulations, because it is within our power to change many, many of those without seeking reform. That is why I call it acquisition streamlining. DoD 5000.1 allows us to waive master test plans. It allows us to use different accounting systems. It allows us great flexibility. It is within our power to do these things. Let me show you how we are doing it.

I want to talk about four areas. First is removing the barriers that prevent us from streamlining the process. Next is increasing the use of modeling and simulation to change the process we use. Third is leveraging and working with industry and defense conversion. The fourth is changing our culture internally.

First, in removing barriers, we have a lot of new techniques we have been using over the last 3, 4, or 5 years. One is best value contracting. Our communications command at Fort Monmouth, New Jersey, awarded 33 percent of all its contracts, not to the lowest bidder, but by using past performance and best value contracting techniques.

The Army has chaired Colleen Preston's panel on specifications and standards, and hopefully this week or next Dr. Perry will sign that specifications report. It will essentially endorse the use of performance specifications at the system level, almost virtually outlawing all military specifications and would require you to get a waiver on all new contracts using any military specification.

Direct vendor delivery. We are going to bypass depots. We have started that on tires, on transmissions, on spare parts, saving vast amounts of money and reducing our inventory.

One of the things I do want to talk a minute about is partnering. We have started a program with industry that is separate from the contract. It is called partnering. We sign an agreement separate from the contract that says how we will work together, how we will resolve disputes, and how we will surface problems. Then the Government people and the contractor work together doing the work, not one auditing the other and saying, "I caught you doing this wrong," but preventing it from being wrong in the first place. It has worked wonders. It has streamlined our contracts, it has reduced the number of problems we have had on these contracts, and it has dramatically reduced the litigation by about 30 percent on those contracts that we have done these partnering agreements on.

The next area I want to briefly mention is activity-based accounting. It is one of the stumbling blocks today, that prevents industry from merging their military and commercial production lines even though they might build identical products. We add certain requirements that cause them to do things differently and cost more. In some cases this is appropriate, in some cases it isn't but they are different. Our accounting system does not allow them to merge that together because they can't ferret out the cost difference, and you would have a different price structure on what they sell commercially versus what you sell to the government.

We have hired Al King, who has come up with an activity-based accounting procedure, and we have tried it out at six locations. Defense Contract Audit Agency (DCAA) looks like they are going to accept it. It has proven the point. First of all, we have gotten for the first time actual data on what and how much it costs the Government for these added requirements. Depending on the six locations where we tested , government requirements cost 16 to 33 percent more on that prod-

uct. This new accounting system will allow us to identify it and subtract it out and allow the contractor to run the same single line.

In the modeling simulation we have digitized our process. Using virtual prototyping we have essentially eliminated the paperwork. We have taken TDP's and going from CAD/CAM systems we have electronic bulletin boards. We give the contracts to the bidders electronically, take back the bids electronically and then give them the whole thing. It goes back and forth very fast electronically.

More importantly, what this allows us to do, is look at the rest of the acquisition part of the process. The acquisition process is made up of milestones. In a series of almost identical steps, demonstration and validation (DAM/VAL), engineering and manufacturing development (EMD), production, each one with a milestone in between. Each one of these steps is made up of concept, design, prototype building, testing. And they are done in sequence. These tools in virtual prototyping will allow you to do them simultaneously, so you will shorten each of these steps. More importantly, you will shorten the decision time in between, because simultaneously you can do the COEA's in effectiveness. Early in design you are testing that thing with soldiers.

Norm Augustine, in his second edition of his book, had this great chart. He loved charts. In one chart he charted the last 300 items that the Defense Department bought and how long it took to develop them. And it went from about 5 years to 15 years over time. Under that he broke it out into the actual time it took to develop it, build it and test it. That was always constant, about four or five years. What changed was that decision time, those milestones. This process will allow us not only to shorten those milestones, but in many cases will allow us to skip them. 5000.1 always gave us the ability to skip a milestone and go directly into EMD or production. But we rarely did it because we didn't want to take that risk. Now, Gil Decker, in the Army, and Bud Forrester are willing to take that risk. With this simulation in COEA's, testing it with real soldiers, we will be able to do that. I don't have time to cover the twenty other initiatives.

The results have allowed us to downsize. Someone mentioned this morning that the Government has not downsized as much as industry, and that is partly true. The Army Materiel Command has gone from 180,000 people to 80,000 people. In the last few years, from '85 to '95, it has gone down 60 percent, an average of minus 3.5 thousand people a year for the last 20 years.

At the same time we have taken out five ammo plants, we're going to take out three more. We have taken out three depots and are going to take out three more. We got rid of two test centers and are going to drop another one. We have done that because our acquisition initiatives have allowed us to take that additional risk. We have reduced our PEO's from twenty-five to ten, general officers from seventeen to five, and SES's from eight to four.

One of the culture changes we have done is create a process called "Road Show" , where the general officers in the Pentagon and AMC go out to each buying command and then physically teach them how to write RFP's, how to scrub them. We have created a procedure in templates to show them how to take out the specs and the reports and all the non-value items and then graded their RFPs to make sure they did it. The results of that is the new training helicopter has under a 100-page RFP with no mil specs. The TOW improvement site is getting second and third generation FLIRs in the force. We reduced the CDRLs 78 percent and have only six plans left and eleven reports. The training system, no specs at all. All of these were bought with best value. The original military GPS cost $34,000. We took out all the mil specs, streamlined initiatives, went to sub-component Non developmental items (NDI), commercial items and the cost is now $1.2 thousand.

Combat command and control vehicle. We tested this. This is the first one that went through our virtual prototyping system and our battle labs. Our soldiers tested the early prototype. That is going to eliminate a lot of the formal testing. We are going to skip DAM/VAL. It allowed us to identify problems early. We are keeping the detail matrix and scorecard on each one of our buying commands.

There is a lot going on, and there is a lot we can do without acquisition reform. We need that acquisition reform, but the important thing is to change the culture down at the buying commands, and we are doing that.

An important message I wanted to get to you was, only one of those blocks we tend to focus on, which is the details of how you write an RFP and how we do business between us and the contractor. But us and the contractor have a partnership throughout that acquisition cycle. And it is the decision block and the fielding block and the testing block that eat up all this time. It is those blocks that we need to focus on at the same time.

Thank you very much.

DR. BRANDT: You can tell Dr. Oscar does like the technology.

Next it is my pleasure to introduce Major General (Select) Robert W. Drewes, who is Deputy Assistant Secretary for Contracting, Office of the Assistant Secretary of the Air Force for Acquisition. He is a native of Illinois, graduate of Colby College, and has a Master's degree in business administration from Harvard, which is obviously important. But probably more important, he is a graduate of the Industrial College of the Armed Forces. He has held a number of significantly important jobs for OSD and the Air Force. I would like at this time to introduce General Drewes.

REMARKS OF BRIGADIER GENERAL ROBERT W. DREWES DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE, CONTRACTING

GENERAL DREWES: Thank you. I am glad to be here and to support this particular endeavor. And I am glad, frankly, that Colleen Preston is not here at this moment, because I think what she is doing is extremely important. Her time spent over there, wrestling with some of the legislation that is about to come out, will serve us all well.

Today's panel is called strategies for re-engineering the acquisition system. "Re-engineering" I put in quotes because that suggests that it was engineered in the first place, which just wasn't true. I think elements of it have been well engineered. What we need to be examining is just the improvement needed to match today's set of imperatives.

What I want to talk about first of all is how we think we are fully supporting what OSD is doing and then talk about some of our own initiatives, not all of them. Then, in the conclusion of the time I have, I will tell you something of what I think needs to be considered as we talk of changing culture, changing the work place, something that is very, very important to all of us. I think we can become very infatuated with what is done here in Washington. But in order to really make change, it must happen in the work place. How do we want to do that?

We believe that we are fully supporting the pilot programs. Now, the pilot programs haven't turned out to be everything they were first described to be, but there is a tremendous amount of value in going through the rigor of pursuing them and challenging why it is we impose upon ourselves in acquisition the things that we do.

We have four non-scrawny programs that we are endeavoring to move forward. We have received the approvals to get many of the wavier requests we need for both JDAM and JPATs, we awarded the JDAM contracts just earlier this month. The rigor we have gone through is important. We have a ways to go, we want to see how these work. Yet to come along, but en route under the commercial derivative aircraft program, are a couple of activities. We are looking at a non-developmental aircraft to supplement the Air Mobility Command airlift capacity. We are also looking at some potential replacements for the presidential airlift wing over here at Andrews.

EC/EDI, we're strong partners throughout the DoD in getting electronic commerce moving. Now, first of all, we recognize that these are not big dollar items. However, they are big items in the operation of our Air Force wings on the installations. This is important stuff, they're the want-one-of-a-nail kind of things. Anything we could do to allow our wings to move rapidly, and get what they need to perform their operation or mission is useful. I think this is going to do it. We are in lock-step with the schedules that have been set. They are kind of ambitious in some regards, but I think that without the mandates that we have out of OSD, we might still be drifting a bit with each with our own little versions of how this might be done. So I think there's been a lot of utility in this endeavor.

What I really look forward to is where we go further. Once we've shown that we can do this electronic commerce for the small purchases, the commodities items under $100,000 kind of deals, how can we transition what we have implemented in a more unified way and go forward into more complex procurements? We have electronic RFPs and bulletin boards and we're getting cost proposals on floppy disks and all that. But, we've got too many different ways of doing that. In terms of standardization, we need to find the proven way to get things done. I think there's a lot to this EC/EDI that we don't want to lose sight of, once we see it coupled first with simplified acquisition.

The MILSPEC/MILSTD PAT, I think was successful. We are expecting more of the formalized implementation to be coming forth shortly. In the meantime, we are using the principles of it to reduce the MILSPEC/MILSTD requirements in a number of RFPs that are currently in the process of going out in big time acquisitions. We think there's a tremendous amount of ben-

efit in this effort and I want to come back to that when I talk about another Air Force look recently completed on micro-electronics.

I want to talk to you a little bit about our Air Force policy review and some of our own pilot programs. When we realized through the initial endeavors on the OSD pilots, how much is really available to change, even within our Air Force control we established our own set of pilot programs. I mentioned this process action team looking at the micro-electronics industry. I would like to give you a little bit of feedback on that. We also have Rand working for us, looking at really dramatically new ways of thinking about how to organize internally to do acquisition.

On the matter of policy review, we have been working for some time to clean up our own history of building a larger pile of regulations. Why do we have to have regulations and policies and procedures to implement those policies and procedures which have already been established? We need to fundamentally ask such questions, and we are doing so.

Now, we are not doing this on a very grandiose scale. Our experience has been that, we establish smaller teams, give them a clearly defined area to go out and examine and tell them to do it quickly,we are more likely, having done that in an iterative manner, to come up with some more substantive improvements. That's going on right now.

Our whole thrust is to add much more emphasis on the guides and the handbooks, to be less dictatorial in some ways, providing much more of the how-to's, the proven lessons learned in the templates. That's where we are headed.

Well, we have now over twenty Air Force pilot programs. The idea is that any program manager in the Air Force can come in and nominate his or her program to be subject to the approvals that we hope would be delegated to a single

point--and we are very close to having that single point identified in the Air Force--who can waive any regulation or policy that the Air Force has established for itself in acquisition.

There is some concern amongst the functional fiefdom stovepipe people, like myself, I suppose. Although I don't have concern in this area, because I really believe that there will be sufficient dialogue on any matter that is brought forward. I am confident we can get the right amount of dialogue going and balanced discussion achieved. If a product of this dialogue is that we ought to get rid of a functional requirement, we will..

So that's going well, and we are getting the waiver requests right now. Interestingly to me, one of the programs that has come in is the F-117 program, a

program--the Stealth aircraft that was so effective in Desert Storm--which was managed under very streamlined concepts under special access. When it had to come out into the wide open world, it just gagged. It made us ask, how could we have done what we did, if we had to live under this? So they have been amongst the first of those to come forward and say we would like a chance to do acquisition with less how-to's.

We wanted to find out what commercial practice means. I have spent a lot of time talking to airlines and the aircraft manufacturers. But we wanted to look at other areas, as well. What does commercial practice mean? Because it varies. It depends a lot upon the marketplace that you are talking about. It's very much marketplace dependent.

One of the areas that we heard a lot about was in the micro-electronics micro-circuits, where, in 1965, we were about 70 percent of the sales of that market; we, the military. In 1995, it is projected to be about 1 percent. So that seemed to be a really good industry to go examine. The team went out, and they looked at twelve companies. They went out and visited them, and they talked to industry associations. They met with the Defense Science Board. A lot of what they came up with was going on in parallel, by the way, with the Mil Spec/ Mil Standard process action team, and they came up with some of the same conclusions, which is kind of a reinforcing principle to me.

The basics are, if you are going to be out there buying from that industry, look at the way industry is controlling its own processes. Why do you have to be relying on your own mil specs and mil standards? Why don't you use qualified manufacturers lists? Why don't you use the ISO 9000? It seems to be working pretty well, so we're going to really go in that direction.

A huge issue that always comes up is the cost of pricing data. I think that, in addition to the flow-down requirements that are a real annoyance, cost or pricing data is perhaps the single most important issue that we have to step up to. I think existing regulation gives clearly far more latitude than we are taking advantage of. There are some other ideas that are being kicked around that I think will be useful.

Another improvement area: annual representation certifications. We have tried it, and we are actually doing it in parts of the Air Force right now. But we need to do that consistently. Why is it, in a single year, that a contractor has to repeatedly provide certifications and

representations of what he is doing unless required by law? If he can do it once, and we have a central data base, why shouldn't that suffice for everyone?

We have this Rand study that I mentioned earlier, we are asking Rand to really go out and look, very radically at what might be possible in reorganizing acquisition. Today, they are kicking off a session with a number of our program managers and functional representatives, at an off-site on the Eastern Shore of Maryland, to really be coming up with some really fundamental changes. It has possibilities. Many of these, perhaps most, have been thought of before. We are not sure where they are headed, but we want everything that has ever been thought of to be brought forward, as well as any exciting new idea.

We are looking at industry. We are going out to visit United Airlines. United Airlines is the first customer for the 777. There has been a lot of talk about Boeing and how Boeing uses some of these technologies that the Army just talked about in designing the 777 and some of their customer interfaces. Well, how does that really work? Federal Express is talking about replacing their entire air fleet, and we are finding out how they are doing it. We think by this fall we will have some of the outputs of these initiatives.

We are looking at testing a whole new RFP format. The RFP format, as we know it today, really goes in genealogy back to the limitations of the 80-column punchcard formats of olden years. That's why you had so many sections of a contract or RFP and why you get paper cuts trying to figure out everything that has to do with a single line item.

We have had a very good contract closeout PAT. It is one of those areas that we normally kind of let fall off the end of the table and not worry too much about, however, with all the changes in the new M account requirements, we are really concerned about expeditious closeout of contracts. That, by the way, has to do with availability of funds for new procurements, since you have to pay out of current funds a lot of those old bills.

We have had some really good bridging mechanisms. I think there is a lot of meat in this; asking people who are really doing the work to get together and pool their ideas and come up with something better.

We have had contractor performance assessment reports for many years at this point. We are looking again at expanding that into services and in other areas.

I am really concerned about how we are going to actually make a change in the workplace. We have to do a lot here, in retraining and supporting the workforce, and I really wonder if guiding principles will get us there. I don't think it is going to get us there as fast as it would if we used some of the already established mechanisms.

I like what the Army does with their roadshows. I think the Army deserves a lot of credit for that. I think the roadshows are excellent. We did something similar when we implemented the Competition in Contracting Act. I think when we make significant change in processes, we need high-powered roadshows that go out and explain to the workforce. I think that is really popular.

I think the schoolhouses need to be really cranked up and talking about the very latest information. It's disgusting to me to see the number of people that come out of schoolhouses and still think that they have to have cost or pricing data for as much as they do. That being such a large irritant, it ought to be something that is emblazoned on anyone, and, they should not be allowed to leave the place until they get it memorized.

Maintaining linkage to the workplace. We are delegating more. We have more teams out there doing all kinds of things. It is going to be tougher to get the message into the work place, and we need to maintain that tight linkage.

We need to make sure that all those who have responsibilities in life for audit and inspection are really locked in with whatever change we are asking the people to make. As soon as we start asking people to do something that is not affirmed in the way their work is reviewed, everything is going to come to a screeching halt. People aren't going to throw away whatever regulations and procedures you asked them to throw away. They are going to go back to what kept them alive in the past.

When we talk about "value," we have been doing a lot of best value in some of our major source selections for decades. The question is, when you get down into buying these smaller items that keep the Air Force running and people make value judgments, one person's view of what is value may be different than another's. When we empower someone to do that, we have to be standing by them. So that has to do with the way we walk as we talk. I worry about that.

Now, after decades, after generations, of building up regulations and ways of doing things, if you throw them all out, I think it would be an awfully traumatic and dysfunctional event. I think people are going to squirm and not be sure what the message really is. I think it would be a mistake. I think it would be far

better to use the vehicle of some of these fundamental regulations that we have out there, which people will be using as their handhold, to guide us into the way we want things to be done in the future.

We have a tremendous amount of dislocation going on in the workplace right now. The Air Force, too, has come down by large, large percentages. We have people being bumped and moved to different locations. If you want to change that work force, you don't throw it open to "local county" rules out there.

If you want to have this freewheeling, and you are going uphill against, I think, a sort of a natural reaction of people to be very concerned about the way things are going, I think we are going to lose ground. So I think we need to have a bunch of crisp must-do's. We just tell people there are certain imperatives. This nation has always expected that the tax dollar not only support a mission, but certain other values of the nation. We have to make sure that happens. We need to make sure that this is orderly. I think it will happen best if we if we have more than just guiding principles out there.

I think industry would go nuts, absolutely nuts, if we all empowered every contracting officer in the Department of Defense to create his own clauses. We have been stretching and pushing and shoving and trying to get some uniformity and prior approval of what we put into our contracts. If we should throw it wide open, I think it would drive industry crazy.

So in summary we are committed to substantial, really meaningful change, and we are about doing that. Thank you very much.

DR. BRANDT: Thank you, General.

Let me introduce the next speaker from industry, Mr. John McLuckey. He is a corporate senior vice-president as well as president for Defense Systems of Rockwell International. In Rockwell, that's defense electronics and aircraft.

Mr. McLuckey is a graduate of California State University in Fullerton, and he is the 1990 distinguished alumni career achiever of that institution.

Prior to his current position, he was vice-president of finance and then president of Rockwell's Defense Electronics Organization. He can talk to us about that finance person being now in a manufacturing organization. I always think of the defense industry as manufacturing. He, too, has held a variety of increasingly responsible positions within Rockwell. It is with great pleasure that I introduce Mr. McLuckey. Thank you.

REMARKS OF MR. JOHN A. MCLUCKEY PRESIDENT, DEFENSE SYSTEMS, ROCKWELL INTERNATIONAL

MR. McLUCKEY: Thank you, Linda. One of the problems these days is we don't have enough manufacturing going on within our industry.

It's a pleasure to be here today and give you an industry perspective. It is not the industry perspective, but at least one reporter's opinion. We talk about acquisition reform. I think if we really wanted to abbreviate everything, we could do it with that one term: Just do it. Because that is what we have to get on and do.

Following up on a point that was made earlier in a question from the audience about what drives change, I will leave you with a couple stories that I think set the stage for all of this. And that is, you have heard the old one, of course, that says there's nothing like knowing you're going to be hung in the morning to focus your mind the night before.

Clearly, I think the motivation should be there for change. The other thing clearly, in picking up another line from somebody who said, "You can't really ring your hands and roll up your sleeves at the same time." I certainly think we have been wringing our hands long enough.

I am sure Colleen is going to give us an update on what is going on streamlining acquisition practices and commercial product procurements, so I will try to be brief.

I would , in addition to talking about some changes that are needed to improve acquisition practices for Government contractors, talk a little bit about commercial product procurement, and then talk about maintenance, modifications and upgrades, and stabilizing the procurement process, which I think are also very timely. How will it affect the acquisition product process, as well as affect the industrial base.

Of course, we have to keep in mind the reason that we are doing all of this. I think this is a sober reminder of why we need to do acquisition reform to insure that we continue to have the world's best fighting forces. As General Bud Forrester said in a recent quote in an article, "Acquisition reform really is not an option."

The critical questions that I think we have to continue to ask ourselves is: do we really have the resolve to do this? Do we share the required sense of urgency? And we keep talking about commercial, but certainly in my experiences one big difference between the defense industry and commercial is timeliness. Are we prepared to be honest about our progress and apply some real metrics when we are measuring what we have done?

We participated in some studies that were done by the ADPA. I have also looked, since we are a multi-industry company that has both commercial divisions and Government divisions located side by side, to try to compare the cost of doing business one to the other.

You have heard many of the speakers talk to you this morning about the wasted cost, really the paper cost. Clearly the overuse of mil specs and standards, the multitude of compliance audits, and the unique contract requirements certainly drive our costs some 20 to 40 percent, and the goal is to do a lot more with less.

We talked about the legislation that was in front of Congress. Let me give you some measures of success as we see it from industry, and I have divided those into two categories; first, that has to do with the improvements to make it easier for traditional Government contractors to sell to DoD. And secondly, will commercial businesses be willing and able to sell to the Government?

Certainly with regard to reforms impacting DoD contractors, I would offer six measures of success. One of them would be: will the Truth in Negotiations Act (TINA) threshold be permanently increased to the $500,000 and then indexed to inflation? Will certified cost or pricing requirements be totally eliminated in competitive procurements? And, of course, we have all heard about how the cost and pricing forms are commonly checked off. Recently, I give the Air Force credit for going forward with a streamlined form that would just ask for the cost documentation necessary to support the prices that have been proposed. I understand that currently is in process review, and I think all of us need to get behind in supporting that measure, because AIA studies show that industry spends something in excess of $250 million-plus a year just in justifying cost and pricing data for competitive procurements.

We would also ask if Congress will enact the $100,000 threshold for simplified acquisition, and we would like to see this even go further to where we are able to flow this down and have simplified procedures and terms and conditions to be applied to our suppliers.

We would like to see the elimination of recoupment charges on FMS sales, and I can tell you that sometimes the DoD seems to be competing with industry in some of the charges and processes and procedures they have. It is very easy, when you are dealing in the international community, if they see a change in recoupment charges--this has just happen to me on a procurement in the UAE--that paralyzes them. They then go through wanting to know why and it delays procurement. We also want to see simplified contract financing systems, less documentation required, and to streamline the progress payment process, as well as increasing progress payments.

We also want to watch very closely now, to see DoD's implementation of the Process Action Team's recommendation on mil specs and mil standards. I understand that it has been signed, and we are just awaiting distribution. Clearly, that is a major step forward in reducing some of the burden that we have within industry. Of course, I know there is also the observation that there has been policies that were saying that they desire to see a reduction or streamlining of the specs and standards that have been in existence for three years. But the culture that we have within the DoD and within industry has seen that was seldom used.

The last series of changes are regulatory changes to FAR and DFAR that we would like to see made. The interesting thing here is, for these to be effective, these cannot be implemented on a single program basis. They cannot be implemented on a single service basis. But they really have to be implemented across the board because these are deeply imbedded into how we operate into all our systems. In fact, that is one of the big areas that I think we can make significant, significant improvements.

The next point, I think, is the most important one that I would talk to you about today. I think it ties a little bit to what Joe Gorman was saying about defense preparation, not defense conversion. Oftentimes, we talk about freeing up our requirements such that the commercial market can serve our needs. The compelling need, as I see it, is to unburden that industry that has been serving you in the military so well for so many years, by taking off all those onerous requirements so that we in fact can get our costs down to allow us to go address other markets. By applying our capabilities to other markets, bringing in that additional base, will at the same time allow us to be able to sell products and services to the U.S. Government for lower prices.

That, of course is a win-win situation. And I think, what we have to resist in all corners, is any additional attempts to throw additional oversight on how we run

business. Because we certainly don't need it, and, clearly, it has no value added. I was delighted to see in Bill Perry's confirmation hearings that he in fact talked about this point of unburdening the defense industry.

The other big thing we need to think about here is the hundreds of thousands of people that have spent their careers serving this industry and who are the ones that I think are needed to be counted on. And so to lift the requirements or this burdening, I think, is going to go a long way.

Turning to the commercial procurement process, we need a balanced approach of not just encouraging commercial contractors to come in and support us, but to unburden defense contractors, have a level playing field, and at the same time expand the overall supplier base and not, of course decimate that.

We need to eliminate flow-down Government unique terms and conditions to commercial subs. And, by the way, that should also include not having to flow those down to a commercial division of your own company.

And we need to, in fact, lift all these burdensome requirements, because I can tell you in case after case where, in our corporation, we cannot use our commercial divisions, because they absolutely steadfastly refuse to accept these kinds of requirements laid on them.

In the interest of time, let me skip going into this whole depot mod issue except to say that we support--and I strongly urge support--for the implementation of the requirements of the Defense Science Board task force on depot maintenance management. And I certainly hope this does not get delayed until BRAC '95. I think this is something we have to get on with doing. We have to understand the significance of the problem we are faced with and get on with allowing us to be more competitive.

One thing that can be worked on without talking about having to go to Congress is procurement delays. The budget uncertainty certainly has caused a lot of this. Project officers mean well, but programs seldom happen on the schedules as planned, for the funding as planned. And, in fact, once you get it, you look over your shoulder to see if the business is going to be there tomorrow. You wonder at times what did you really win. I think, as Gorman mentioned also, that the DoD, all the services, could look and take a hard look at cycle time when they work this subject.

Finally, while we need to stabilize this process, let's not get confused or sidetracked by discussing pockets of success. Every service can talk about pockets of success. We really need more meaningful metrics to measure progress It has to be pervasive change, not change or improvements that we see on singular programs, but across the board.

And again, as Joe Gorman mentioned this morning, and one thing I strongly believe in, you know, as a management concept, that we measure what's important. Let's send a clear signal across all the services by what DoD will measure. Let's really get serious about a critically important task, acquisition reform. Let's do it and quit talking about it. There are hundreds of thousands of people out there depending upon it.

Thank you.

DR. BRANDT: Thank you, Mr. McLuckey.

Well, again, we love it when a plan comes together. I was going to say "straight from the front lines," but I am not exactly sure if it is straight from the front lines. This is Colleen Preston. She is the Deputy Under Secretary of Defense for Acquisition Reform. She received both her B.A. in political science and her J.D. with honors from the University of Florida. She has a Master's of Law with emphasis on Government contracting from Georgetown University. She was an attorney advisor in the office of General Counsel, Secretary of the Air Force and Counsel, Investigations Subcommittee, Assistant General Counsel and then General Counsel of the Committee on Armed Services, the U.S. House of Representatives, which is of course why she is so specially suited to deal with the kinds of things that she has been dealing with. Initially designated Special Assistant to the Secretary of Defense for Legal Matters, she has since June 24, 1993, served as Deputy Under Secretary of Defense for Acquisition Reform. So here, directly from where it is happening, at least in Washington, Mrs. Colleen Preston.

REMARKS OF MRS. COLLEEN A. PRESTON
DEPUTY UNDER SECRETARY OF DEFENSE
FOR ACQUISITION REFORM

MRS. PRESTON: Well, directly from where it's happening is from the Acquisition Reform Senior Steering Group, as opposed to the markup of the Senate Bill S. 1587.

Many of you have heard me speak before about why we need acquisition reform, including a group of senior students here at ICAF yesterday. What I would like to do today is to simply talk to you about what our priorities are, what we have been doing this year, and the kind of problems that we are having in trying to enact acquisition reform initiatives.

The previous speaker could not have given me a better lead-in in terms of what it is we are trying to accomplish, because we set out to establish three things this year in legislation. That is, to get pilot programs authorized, to remove impediments to the purchase of commercial products and to remove impediments to those defense companies to make them more competitive in terms of selling in a global marketplace, and, third, to increase the simplified acquisition threshold from $25,000 to $100,000. That is from a legislative standpoint.

Then I am going to talk to you a little bit about our Electronic Commerce/ Electronic Data Interchange Process Action team (EC/EDI PAT)and the specifications and standards PAT team.

First, in terms of where we are in the legislative effort, you have probably heard already that the House Armed Services Committee marked up their bill last week, and the Senate Governmental Affairs Committee is marking up their version. They began at 10:00 o'clock this morning. The Armed Services Committee on the Senate side will begin at 2:00 o'clock.

We hope to have these bills on the floor and passed very soon, if not by mid-May. We are running into a few little problems, as might be expected, in terms of getting political consensus so that we can get these bills up. But it seems like things keep coming out of the woodwork. As late as 9:00 or 10:00 o'clock last night, we were being advised of various amendments that would be offered.

But let me give you an idea of the issues that we are talking about here, where we have requested legislative relief. In either the House or the Senate bills, we are running into problems.

The Buy American Act. We requested a blanket waiver of the Buy American Act for all commercial items and purchases under the simplified acquisition threshold. We have now bargained our way back to a national security exemption, where we would simply define what is in the public interest in terms of the Secretary of Defense deciding whether or not to waive the Buy American Act. That would include access to state-of-the-art commercial technology, which is critical.

It is not that we want to buy foreign technology. We need the waiver, because we need to buy commercial state-of-the-art technology. Frequently, commercial vendors cannot verify, for us, what components are made in the United States, but they do not want to install inventory tracking systems to ensure that they can keep inventory segregated to satisfy certification requirements that they are providing the Government a product made up of 50 percent or more of the components in value. So what we have done on the Buy American Act is ask for an exemption for national security reasons if we consider the need to get access to state-of-the-art commercial technology.

We have also asked for relief in terms of ensuring that we have a mobilization base, in the event of a difference between the rules of origin under the Trade Agreements Act versus the Buy American Act. Those of you who are steeped in all of this know that in one case the Trade Agreements Act had a substantial transformation test in determining whether or not it is a qualifying product. For the Buy America Act, it's a 50-percent components test.

What we have tried to convince industry is that they are better off with the substantial transformation test, but to no avail. So we have come up with a compromise: That is, in any circumstance in which a U.S. product would be at a disadvantage compared to a foreign product because of the utilization of a Buy American test, we would not apply it.

The best example is--you have a computer system. That system is made up of components which are 70 percent from Taiwan, 20 percent from Japan, and 10 percent from France. Or, say, 10 percent from the United States.

If that computer system is packaged and put together and substantially transformed in France, which is a signatory to the Trade Agreements Act, it is considered a

French product, and under the Trade Agreements Act, it must be given the same entitlements that U.S. products are. So it comes in as a U.S. product to the United States. That same product, with the same components, manufactured in the United States, would be subject to the Buy American Act 50-percent component test and would not qualify as a U.S. product and would get a price differential added to it, compared to the French product.

So we have said, where that anomalous situation occurs, we want to make sure that we don't apply two different standards and will apply the rule-of-origin that makes the most sense.

Finally, the other problem we run into on the Buy American Act arena is, for example, in the area of aircraft engines, where domestic companies have found that it is preferable to do business in a way where they incorporate foreign components, like engine blades. In return, they have agreements with those foreign components companies to utilize their components in the engines that are being produced by the companies overseas. That is all well and good, and, in fact, that component is less than 50 percent of the end product, which in most cases the Government is buying is either an engine or an aircraft. So it easily fits under the 50-percent Buy American components test, and you can buy it and sell it to the Government.

But what happens when you have to go out and buy a replacement blade? The blade is then the end item, and the end item is a foreign end item, which cannot be purchased and put in a U.S. Government product. So it is a "catch-22." What does that mean? It means that the supplier has to have one source for their commercial customers and a U.S. replacement source in the engines they provide to the Government. These are the anomalous situations we want to fix.

Some other problems that we are trying to address and having a very tough time of it are relief from the Davis Bacon Act and the Service Contract Act. We are trying to increase the definition of a commercial item and expand the concept of a commercial item to include items that are being produced by commercial companies but not yet introduced into the marketplace.

Well, a lot of people have said that's crazy. If it hasn't yet been sold, how are you going to verify whether or not the price is reasonable? That's the whole point in having a commercial item definition, isn't it?

And we have said no. There are a lot of reasons why we want a commercial item definition that is very broad, and it is to waive lots of other Government-unique rules and regulations. You have to divorce that thought from how you are determining whether or not you have adequate price information or cost and pricing data to establish a fair and reasonable price.

In essence what we have been trying to sell, halfway successfully so far, and we hope to be more successful if we get to conference, is a new process where, rather than having the Truth in Negotiations Act standard with exceptions, we will establish a new pricing regime.

Under this regime, the contracting officer will first determine whether or not there has been adequate competition. If there has been adequate competition, the contracting officer shall not--and that is a very important change from the existing regulations, which is you may execute a waiver--shall not request cost or pricing data. If there has been an established market price, the contracting officer shall not request cost or pricing data.

Finally, in those instances where you cannot meet one of those two tests, for example, a commercial item that is no longer being sold in the commercial marketplace, but we still buy because we are supporting 20-year-old systems, that we haven't upgraded to the latest model. The item is produced only for the U.S. Government, and is no longer a commercial item. For that item, or an item that is state-of-the-art technology and not yet sold--we would require the contracting officer to ascertain whether, by other market means, or other tools at their disposal, they can determine price reasonableness by looking at past history.

For example, if the Government has purchased something for 20 years now, we are fairly certain we have a good idea of what the price is, barring some major change in a component price or material or labor. Yet under TINA, we are still required to get cost or pricing data if it does not fit within one of the exceptions. That is ludicrous. We shouldn't have to do that. We can establish fair and reasonable price, even though it doesn't fit within one of the typical exceptions.

If it is technology that we are replacing of a similar nature, we know what that technology costs. We know what technology is in existence, and we can compare that price and ascertain whether or not the value that we get out of the new technology is worth the additional price. In some cases, the price is even less than existing technology, and yet we are still required, under existing law, to get cost or pricing data. Again, a ludicrous situation.

What we have said in our proposals to the Senate, if the contracting officer can establish price reasonableness through these other methods, then the contracting officer shall not request cost or pricing data. Then we

have thrown in the underlying caveat: if you can't figure out whether the price is fair and reasonable, even using the tools that I have outlined above, then you go back in and you request cost or pricing data. That would be a fundamental change in the way we do business, and that, in and of itself, will encourage a lot of companies who now refuse to sell to the Government to in fact do business with us.

There are a number of issues that we are also addressing. We are asking for the authority to do direct 8-A contracting, so that the agency can do it without going through the Small Business Administration. We are asking for relief from subcontracting plans for commercial items.

All of these things are, of course, very emotional. On the recoupment issue, we found out, just before the markup in the House, that the recoupment provision would be deleted. So, we are back to square one on recoupment. But we are trying to work some things, and the problem we are having is that for every two steps forward -that we manage to cajole out of the Congressional staffs and the members-they impose one new requirement on us. So for every two steps forward, we are talking one backwards.

For example, they want to establish new prohibitions on the use of task and delivery order contracts--one that is more onerus than today's system. We are trying to explain that the process for change must be based on decisions whether or not the cost of maintaining the existing system or change is worth the benefit we get from change or from trying to make the system perfect--i.e., elimination of all risk!

Our conclusion, and that is a conclusion that has been made by the Secretary of Defense, is that in fact the existing system, and the way it is operated now, does not justify the additional cost, that we need to assume more risk in the process, and that we cannot lose nearly enough money to make up for the additional costs that we have imposed on the system as it is.

I said I would mention our EC/EDI PAT team and our specs and standards PAT teams. On EDI, let me just say very quickly that we are in the implementation phase. What we are trying to do is what I would call a model for DoD in terms of what the role of OSD is and, in particular, my office. And that is for OSD to be a leader in facilitating agreement between the services and other organizational components within DoD on how they will satisfy a needed requirement--in this case, the need to have an electronic commerce, electronic data interchange capability.

Instead of having everybody out there on their own, looking for money and attempting to put together an EC/EDI system, we finally got all the players together and said, "Let's pool our resources. Let's pool our money. Let's pool our talent, and let's figure out what the best system is for everyone." We are working that effort very hard.

On the specs and standards report, the report has actually been approved by the Deputy Secretary, but the implementing memorandum we are just now putting together and getting comments on. So it will be another several days, at least, before we have a memo signed out by Secretary Perry.

Finally, I would just like to mention that we will be establishing a number of additional process action teams within the next month to deal with such issues as the requirements determination and resource allocation process, a review of DoD 5000.1 and 5000.2 to providing guiding principles and tailoring of those regulations. We are looking at the DAB process and documentation.

We are participating right now in drafting the guidelines for the rewrite of the Federal Acquisition Regulation. We are going to look at contract administration process, re-engineering the contracting process, and utilization of IPPD in remanufacturing. Those are just a few of the list, about a 20-page list now, of topics that we hope to get to. But these are the priorities for up and coming process action teams in terms of what it looks like now.

With that, I would like to thank you for your attention and look forward to your questions.

DR. BRANDT: Thank you, Mrs. Preston.

QUESTION: It seems to me that we on the industry side have a contribution we could also make. There has been a noted tendency with the downsizing, as soon as the non-winners are known, they head either for the GAO or, if the program is big enough--you may even have one of these in your company someplace--the non-winners head for their Congressional delegations, try to force the decision to the political process, as opposed to the source selection process.

Do you have any suggestions on how we in industry might be self policing on this?

MR. McLUCKEY: That is a tough question. The fact of the matter is that we have become more litigious. There are more protests. There is a lot that we need to do to stay off of the Hill, to try to make sure that there is a level playing field in procurements, to go out there an give it your best try and if you lose, you know, go on to the next one.

Clearly, as I mentioned, you do have to look over your shoulder and wonder often these days: what did you win? Will it stick? If you staffed up and somebody protests, if the service decides to put it on hold until they look at that protest, that costs you a lot of money. So we need to do something. I don't have a suggestion as to what kind of a group might be formed to try to look at that and see if we couldn't band together to eliminate it. But I think that is a worthwhile suggestion.

We are working at the other side, though, of that procurement cycle, doing a lot of things to try to streamline our bids, to try to work on the use of electronics, use of data bases, and doing things so that we can in fact keep our bid proposal costs down, which is precious money that is affecting costs. To the extent some of that goes back in overhead, it is driving up our overhead costs. But that is a very good point, something that Colleen might even want to look at a process action team on that to see if you couldn't get industry to step up to.

MRS. PRESTON: Well, if I could, I would just like to add one thing to that. John and I really hate to ruin your day after I told you about recoupment not being in the bill. There is one provision that is in both bills right now, and that provision is to require that the Department of Defense delay performance under a contract until after the protest period has expired. You know that the normal rule now is that you begin performance immediately, and then if there is a protest within the ten-day period of time, you can then suspend performance, or you either have to suspend performance or execute a waiver.

This would change the presumption because of the concern that I know I articulated back when this provision was adopted as part of CICA, that the Government would bear the expense of stopping and starting the contract. And now everybody has finally figured out that the Government has all these additional costs because they are stopping performance mid-contract.

What they want to do now is say, "Okay, Government. You just can't issue a notice to proceed until after." So you are going to have an automatic built-in 10- to 15-day delay period after any award, if that provision stays in.

DR. OSCAR: One area I think the Government can help that I have been noticing lately: we have not made a whole lot of progress changing the cultures in debriefings. There has been a culture in the Government of: don't tell them much in the debriefing, because they will use it against you in court.

I think, in certain buying commands, we have slowly gotten to the point of laying it all on the table, and it has reduced the amount of protests. I think that has helped a lot--being up front about how we selected and why and laying out all the details.

GEN. DREWES: In fact, I didn't dwell on it, but one of the items I had up there is the debriefing. The Air Force has moved, contrary to a lot of advice from others, toward much more comprehensive debriefings, and the results have been wonderful. Our actual protests so far this year--and I am not encouraging a counter-trend here--but the protests are substantially down from the previous years, and we attribute a large part of that to the fact that we are giving a lot more descriptive information of what happened in the source selection in the debriefings.

QUESTION: Hi. I'm Donna Grimes from the Coast Guard. I have a question for Dr. Oscar. You spoke about partnering, and I am a contracting professional. I am interested in when contracting officers get involved in that process and the impact on competition in the acquisition cycle. Are you calling in contracting officers early in the stage or having discussions with the contractor and then bringing contracting into it later? So my question really has two parts, the acquisition contracting professionals- when do they become involved? Could you also discuss a little bit about the impact on competition.

DR. OSCAR: In the source selection process, in

the RFP, we announce that we are interested in a partnering agreement. It is done at a high level between the government and industry. It is usually done between the president of the company and the commander of the buying command. It is really not a contract function. It is done separately from the contract. It is simply: how are we going to work together? It is purely voluntary.

So we work out the procedures on the contractor side. If you have a problem, how do you raise it and who do you go to? The same thing on the Government side. If we have a concern, who do we talk to? If that doesn't work, how do we elevate it to the next level?

We need to lay all this out ahead of time and establish all these in writing. Then, as they work together, we find that the problem solving and litigation goes way down. But it is not part of the contract.

QUESTION: Marty Sierocki, ICAF. My question is for Mrs. Preston. Could you talk a little bit about the political dynamics of the FMS recoupment?

MRS. PRESTON: Certainly. The issue on the FMS recoupment is one of whether or not you see it from the perspective of encouraging arms sales versus one of encouraging exports to support defense industry. That's really where the two sides lined up.

In this case, the side that sees anything that encourages exports of U.S. defense weapons as being something that is encouraging an arms race was much more vocal than that side of the group which said, "We need this business, and these weapons are going to be out there in the world anyway. They might as well be U.S. weapons." So that's really where the dynamic was. The members just felt that they could not afford a vote on that issue, given the fact that there doesn't seem to be any resolution or any ability to compromise between the two groups. It is not dead forever, but someone is going to have to get together with the arms control groups and see if there isn't some compromise that is achievable.

QUESTION: I'm Henry Jehan, an Army student at DSMC. My question has to do with mil specs and mil standards. It appears to me from what I've heard that there is a major move to eliminate them. I'm not sure that we have seriously looked at the history from which these have been based. Going back to the Spanish-American War, which is where we had problems of troops in the field, soldiers, sailors, airmen who were dying because the equipment was not functional and not properly packaged, et cetera. I don't get the feeling that we are tailoring what we are throwing out and preserving what we really need to keep as opposed to just throwing the baby out with the bath water. Can you address that some?

DR. OSCAR: The report is moving toward having system level performance specifications to allow the contractors in industry to come in with the latest and best capability and technology. What has been happening--take where I used to work at Tank Automotive Command--we had 50,000 different spare parts we bought every day--and we could not afford to have thousands of engineers sitting around reviewing each one to make sure it had the latest details on soldering. So year after year you buy these spare parts, and in the body of the contracts, somebody pointed out to me at break, it actually said the contractor had to sign that he was conforming to the contract.

Well, I can't remember how many phone calls we used to get. Somebody would call up and say, "Do you really want me to weld this with this 1937 welding technique?"

We want to have a specification that says what it is we want to buy, to allow industry to say, "Well, here's the latest technology in manufacturing," or "here's a way we can make it cheaper and stronger and better." Not that we throw up our hands and say, "Well, give us anything you want." We need to write a good performance spec that says how this weapon will perform and what kind of survivability and what kind of characteristics we want. But we have to get away from the how-to-do and how-to-weld and how-to-bend and what standards to use.

GENERAL DREWES: We recently took the concepts, the general philosophy, of the mil spec/mil standard PAT and applied it to a space program where we had approximately 40 mil specs/mil standards. We carefully reviewed. We did not just arbitrarily dismiss them all. I think we retained about seven. One of those was found by the micro-circuits review to actually be an industry standard in a certain element of what they did. That is to say, if we said we were going to use nothing but an industry standard, we would still be okay, because the industry standard was the mil standard. So we have been careful, and what we found that the thesis of that team is right on the mark. I mean, it is not off at all.

MRS. PRESTON: If I can just add to that, there are also some misconceptions about what the report actually says. That's fair, since it has not been published yet, but it is a change in the presumption. It does not preclude the use of mil specs. It is a change in the presumption, so that there is a presumption that we will use performance specifications or standards, use non-

Governmental specs and standards where appropriate, and then the last alternative would be the use of a mil spec or standard.

There is a lot more that comes into play here than simply establishing the preference for how and what specification type you are going to use. There has to be a lot of work done in terms of working with industry to set up third-party certification organizations that can take over some of these functions.

One of the most critical issues that was addressed by the PAT team was: if we change a specification, to update it to the 1992 or 1993 version of the soldering standard from the 1940 version, how do we let that company then go back and change over on all their other contracts, so that at least within their plant, there is only one standard being applied. How do you do this without having to go through the excruciating process of executing change orders and trying to come up with what compensation is the Government entitled to? Is there savings here? On and on.

The PAT team documented that it cost the Government about $5,000 to process a change order. If that facility happens to service various clients and a number of different contracts, you have to negotiate with every single contracting officer on contracts that you have. Part of the process is looking at that, as well as we need to look at some new contracting tools.

If we are going to move away from a military specification or standard, and we are going to utilize a commercial specification or standard that may not be as specific as the mil spec was, then maybe we don't want to go out and buy from the low bidder on a sealed bid basis. What we want to do instead is buy on a best value basis. Or we want to go out and use QPLs or QMLs. Or we want to first article test. All of these things we can do, but they have to be looked at in total. The process action team did that. They have come up with a phenomenal report. Our challenge for the future is going to be whether or not we can implement that report, because the direction is there. It really is.

MR McLUCKEY: If I can just make a comment from the contractor's perspective. If you think of the electronics industry, that, other than if you had a requirement for a space-rated part or a radiation-hardened part, other than those examples, it is doubtful that you would have something specified in the mil spec that would be later than what is being done out in the commercial industry. So why would you need the specs and standards?

I think the theme of what I understand is going to be coming down, it is going to ask for the test, the reasonableness. They are not just taking and throwing out all the specs and standards at the outset. But certainly, when you have programs--and I can think of one that we are into- we are seven years into the program, and we still don't have a software requirement spec approved. Something is wrong.

RADM SMITH: I'm afraid we have run out of time. Please join me in giving a hand to this excellent panel. We will now break for the luncheon.

PANEL ON "IMPLEMENTING THE STRATEGY— CHALLENGES AND CHOICES"

RADM SMITH: After the excellent lunch and with the beautiful day outside, normally at ICAF it would be a challenge to keep everyone awake, especially those sitting in the back half of the auditorium there.

I am certain this afternoon we will have no such problem, because we are moving from the generai to the specific. We are going to have an afternoon panel on implementing the strategy, challenges and choices, and I am please to introduce Dr. Susan Tolchin, who will be the moderator of this afternoon's panel.

Susan Tolchin is a professor at George Washington University, a Professor of Public Administration. She received her bachelor's degree from Bryn Mawr, went to the University of Chicago, for her master's, and then to New York University, for her Ph.D. She is now teaching here in Washington. She is really peripatetic.

Dr. Tolchin is known for a number of very provocative or thought-provoking books, "Buying into America," "Dismantling America," "Clout," "To the Victor," and finally, "Selling our Security."

We have had the pleasure of having Dr. Tolchin here at ICAF as a distinguished visiting professor, sponsored by the NDU Foundation for this semester, and I am delighted to welcome her to the podium here with her panel for this afternoon. Dr. Tolchin.

DR. TOLCHIN: Thank you very much, Admiral Smith, for that very generous introduction. It is a pleasure to be back here. I enjoyed a wonderful semester here, and I see many familiar faces in the audience.

Welcome to this panel on, "Implementing the Strategy-Challenges and Choices." This afternoon we have a sterling representation of industry, Government, and

Capitol Hill for you, and they are each going to give us the perspectives from their particular constituency. We are going to begin with Dr. Denman, then continue with Ms. Garman, Mr. Odeen, and Admiral Bowes.

Our first speaker will be Dr. Gary Denman, who is now the director of ARPA, the Advanced Research Projects Agency, as you all know, formerly known as DARPA, which is one of the Government's premier research and development agencies that provide advanced military capabilities.

Since you all have everyone's bios, I am just going to pick out some of the highlights. Dr. Denman is responsible for managing the agency's projects for high payoff innovative research and development. And as you also know, the agency can now use the word "commercialization" without getting into big trouble.

Prior to joining ARPA, Dr. Denman was the Deputy Director of the Air Force's Wright Labs at the Wright-Patterson Air Force Base, and he was responsible for a very broad range of technologies related to weapons systems. He was also Director of the Air Force's Materiels Laboratory, where he was known for his innovations, particularly in the area of high temperature materials for advanced propulsion and hypersonic vehicles. He was also the Director of the Air Force Manufacturing Technology Programs, where he was a leader in a number of advanced manufacturing technologies.

He is an engineer with a Ph.D. in Mechanical Engineering from Ohio State and has also served as a consultant to numerous Air Force and DoD study teams.

Please join me in welcoming Dr. Denman.

REMARKS OF DR. GARY L. DENMAN
DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

DR. DENMAN: Thank you. The acquisition reform business, which you have spent most of the day talking about, is a very difficult challenge, and of course, it is intimately tied to what I like to call an affordable defense. We all know, that the modernization budgets in the Department are down more than 50 percent from the peak of the Cold War. This presents major challenges, not only inside the Department of Defense but, more importantly, to industry, as industry goes through downsizing, consolidations, diversifications--that is, conversion in some cases.

But it has really created a lot of stress inside the Pentagon. In fact, I heard a story this morning, but I have not had a chance to confirm it, that one of the most respected staff people in the Pentagon who works in OSD on the modernization programs and has been very successful in pushing through a number of important programs has reported to have, over the past week, been through some rather stressful events. It turns out, somewhere around last Wednesday, he moved his desk from his office out into the anteroom by his office. His coworkers kind of looked at him, but nobody wanted to say anything to him, because they knew he was pretty stressed out.

The next day he came in and he moved his desk further out, right next to the secretary's desk. And still, nobody really wanted to say anything to him. And then the next day, he moved his desk out into the hallway--one of those endless hallways in the Pentagon, which I am sure you have all seen. And still, his coworkers didn't want to say too much to him.

Then today he moved his desk into the men's room. Some of his coworkers got together and said, "Look, we really have to talk to him, because this really isn't right." So one of them was appointed to go in and talk to him. And he said, "Look, we really don't want to say anything to you because we know times have been a little tough for you the last few weeks. But we really don't understand at all why you moved your desk into the men's room."

He said, "Well, this is the only place that I'm sure I know what I'm doing." So things are a little tough in the Pentagon, too.

Acquisition reform takes on many flavors. I want to focus on the technology in ARPA programs that relate to acquisition reform. I believe it begins with a top-level strategy, that I am sure you have all heard some discussion of today, as well as over the past weeks and months. It relates to a strategy to move toward an integrated industrial base. We must break down the barriers that have incentivized industry to form very separate military or defense industrial activities separate from, and in many cases, with very high walls between defense and commercial operations.

We all know there are a number of acquisition polices and rules and, in many cases, laws that in fact have created this environment in the U.S. In many cases, we have two very separate, industrial bases. This is a critical cost issue that we must address.

Affordable defense is no longer a choice--it is a

mandate that we make these kinds of changes. I am sure Colleen Preston, who I understand was here this morning, talked a great deal, about these issues.

So the kinds of things that are going on in Colleen Preston's office with respect to acquisition reform in the formal sense, are critical to the near term in implementing this strategy. ARPA's role is longer term, our strategy is to stimulate the movement toward an integrated industrial base through our dual-use technology efforts. That is, we are investing in technologies that satisfy a defense need, and also have potential to impact the commercial sector.

This has been ARPA's strategy for the past number of years, but we have been very focused on this strategy for the past year or so. Part of the program at ARPA, proclaiming the dual-use concept, is called the Technology Reinvestment Project or TRP. It has become a very visible program. Industry response to our solicitation far exceeded my expectations.

As many of you know, we had approximately $470 million in fiscal year '93. It was mid-year fiscal '93 before the decision was made to execute this program. We received approximately 3,000 proposals. With the resources we had, including use of some fiscal year '94 resources, we were able to award about 200. We are very concerned about the low selection rates in terms of our relationship with industry. I can assure you, that we are taking steps to change that. But I didn't come here to talk about the details of the TRP. There will probably be time in the panel session for TRP questions.

I wanted to more talk about what our strategies are behind the TRP, which now has become a program funded at about $625 million to $650 million a year. It has become a very robust program. For those of you who are aficionados of the TRP, the previous work we did in '93 allocated about 50 percent of the money to these dual-use technology development business. The rest of the money went to activities associated with deployment or technology transfer activities, as well as some manufacturing education activities.

For the balance of fiscal year '94 funds and for fiscal year '95, we intend to target more than 80 percent of the resources toward the dual-use development business. So we are talking 80 percent of $650 million a year, a very substantial sum of money. This, of course, is all in addition to many other programs in ARPA which are dual use. In fact, the total in ARPA for dual-use technology is about $1.8 billion a year.

You know, ARPA's strategy really comes from a view long held in ARPA, and very sharply tuned over the last year, that the key approach to implementing and transitioning technology to product is through a dual-use marketplace. As such there are commercial incentives, as well as the military requirements pull, in order to move a technology from concept to actual implementation into products.

We believe that there are three ways you can look at the dual-use technology business. Again, making sure I am very clear when I say dual-use, I truly mean that there is a clear and unequivocal military need for the technology, and the technology can come in the form of products or processes. But we must keep very rooted in the military need for a particular technology.

The first of the three approaches is what some call "spinning out" technology from the defense sector . The most important motivation for me as an employee of the Department of Defense is to preserve access to a key technology that we are in danger of losing as the industrial base goes through its downsizing and consolidations.

One example of a program that we awarded in TRP that has raised a lot of questions in terms of its relevancy to the Department of Defense, is one of repairing bridges in California. Any earthquake zone has a serious problem of bridge reinforcement and repair. The concept is one put forth by a consortium of people in California to over wrap freeway columns, railroad columns, and so forth, with composite materials.

It looks very attractive. In fact, there have been some tests that in fact show that you can extend the survivability range of column-supported bridges by nearly an order of magnitude, maybe two orders of magnitude in terms of earthquake intensity. And that's pretty impressive, if you just look at the cost of repairing two or three bridges in the recent California earthquake.

But why does defense care? Defense cares for a very simple reason: the composites business is very important to the Department, whether it is airplanes, in some cases ships, and many other products. If you look at what has happened in the advanced composite materials business and structures business over the last couple of years, you will find we are in grave danger of losing that technology.

The Japanese are very strong in the technology. They have captured almost all of the commercial marketplace in the form of sporting goods, which is a large consumer of composites. Almost all of the materials, except for some very special materials, is Japanese-supplied, not U.S.-supplied.

So one or two of our large companies that produce graphite fibers--which is the fiber of choice in most

advanced composites--are at serious risk of simply not being there for defense. This program is really one of trying to find alternate markets for a key technology for defense.

Obviously, it also has economic impact in the context of dual use. But the reason I supported this program was the defense perspective on it and preservation of defense access to a key technology. There are a couple of dozen TRP programs that are designed just for that reason, to preserve access through spinning out defense technology to other markets.

The second strategy is one some call "spinning in." I like to call it "defense markets for use of commercial technologies and products and processes." While we don't have too many of these efforts in the TRP, we are trying to stimulate more acceptance of commercial products and processes into the defense industrial complex, and therefore move towards an integrated industrial base.

Now, one of the key areas where there is quite a bit of work in TRP in this regard is manufacturing processes for electronic components to include health care technology, that are focused on trauma care. I don't have to, describe why the military is interested in trauma care. Some would call it battle field casualty care.

We are trying to move the knowledge and technologies associated with trauma care, emergency rooms, and those sorts of activities in the private sector into the military. So that is a "spinning on," if you will, of commercial technology for defense to take advantage of the same products available in the private sector.

Then the third category, which is by far the largest activity, not only in the TRP but in many other ARPA programs, is the new dual-use technology development. As we make our decisions and choices in where to invest--or as some like to say--as we pick the winners and losers, the ability for a given technology to move between both military and commercial markets is a key factor in our investment decisions, particularly for the TRP program. There are numerous programs that we are supporting in the TRP, as well as other ARPA programs, that are in fact dead center on that strategy.

For example in addition to composites for bridges, we also have a very substantial program that is being initiated to move composites into engines. Several engine companies, particularly Pratt and Whitney, and more importantly a whole series of Pratt and Whitney suppliers, are involved. This effort includes, not only the non-rotating parts of engines, which they have been in for a while, but also in the rotating parts of engines. The next generation engine demands composite fan blades. I don't know how many of you have seen a fan blade on a modern engine, but they are this big. When they are rotating at the velocities at which they rotate, it's a very, very challenging design problem to use metal in that kind of rotating structure because of the size and weight.

And don't forget--all of us that fly on commercial airlines--if one of those blades is thrown off of the engine, you don't want it coming through the fuselage. So what is called containment of the blades is perhaps one of the most serious design challenges. If you cut, half of the masts out of the blade, you reduce the containment problem by the same kind of a factor.

Another non-TRP area in which we are very strongly positioned in our dual-use strategy, is the broad spectrum of information technology. Included are computers in the high-performance computing program at ARPA, which is a very large program of $270-or-some-odd million a year; software; electronics; and advanced packaging of electronics. All these programs, add up to several hundred million dollars a year, are designed around a dual-use strategy to try in parallel, to drive toward both commercia and military applications.

Now let me say something about that commercial side. In my introduction you said that we can now speak of commercialization. Well, that's true. But I believe it is very important for the Department of Defense to stay very coupled to defense needs. We can then work with industry and other Government agencies, to sort through the commercial marketplace.

I believe ARPA has a pretty good perspective on the military marketplace. We have a lot of interface with the requirements people and so forth in the military, but we are very weakly positioned in terms of the commercial marketplace and its drivers.

The key factor in moving forward is, first of all, to establish the right kind of dialogue, and we are working every day to expand the companies with which we have a continuing dialogue. We have chosen to use an almost singular tool to sort through the commercial side of this equation. That tool is one of commitment to cost share the development, and cost share in ways that commit the company. Generally translated, this means cost sharing with cash, not cost sharing with in-kind-type activities, although we have certainly accepted some in-kind cost sharing. That is the primary metric and probably the only metric we really have to understand whether an industry is serious in moving a product into the commercial sector. We certainly plan to continue this cost share part of the program. Congress demands it, and I think it is a critical factor in the

dual-use technology business.

Congress gave ARPA some special authorities over the past couple of years to do business with industry in a very different way. I have the authority to operate totally outside of the procurement contracting business. And, in fact, today more than half of the ARPA program is being conducted with industry under non-procurement contract rules; that is, outside the FARs.

We obviously have to obey the laws. When it comes to the socio-economic aspects that are very troubling in terms of how to deal with those in procurement contracts, we simply put in our agreements--and that's what we call these things, agreements, rather than contracts--we simply say, "Obey the laws." There are, of course, numerous laws that relate to socioeconomic questions of equal opportunity employment, or whatever it might be.

This past year, I was also given the authority to use these kind of agreements for hardware development programs. In the past, we had been allowed to use them only for R&D activities, where the primary deliverable was paper or knowledge.

We are planning to do a couple of programs this year, one in the high altitude UAV and another one in the new radar development, where, hopefully, if industry and ARPA can demonstrate that there is really payoff to this, we will be writing non-procurement-type programs for hardware delivery. Now, this is not directly extendable to all procurement contracting business. In fact, I think our primary job, as we experiment with this new authority, is to do it in such a way that we will be the pathfinder and the process will extend into the larger procurement contracts.

So dual-use technology and new business relationships are the current focus at ARPA, and we must have industry cooperation. I think that's going very well. Thank you very much.

DR. TOLCHIN: Thank you very much, Dr. Denman.

Our next speaker is Ms. Cathleen Garman, who is a professional staffer on the Committee at Armed Services. I am happy to say she received her master's from George Washington University and her B.A. in political science and journalism from the University of Wisconsin.

She has participated, since joining the House Armed Services Committee in 1990, in a variety of acquisition improvement measures. Of particular interest to us are the provisions adopted in the annual Defense Authorization Acts. She has also helped develop policies relating to the defense industrial base and small business contracting, as well as drug and addiction programs.

Before her present assignment, she worked at the Small Business Committee and developed legislation relating to small business procurement and innovation.

She began her career as a legislative assistant and has also served two years in the Philippines as a Peace Corps volunteer.

Would you please join me in welcoming Ms. Garman?

REMARKS OF MS. CATHLEEN D. GARMAN SENIOR STAFF MEMBER, HOUSE ARMED SERVICES COMMITTEE

MS. GARMAN: Thank you very much. Last October I was here talking to a class, an ICAF class. Unfortunately, it was right at the end of conference, and I lost my voice. So hopefully there's not something in the water here or something like that, because that was the last class that heard my voice for over a week. I guess my colleagues were a little happy about that, as I kind of croaked through the rest of the week. Unfortunately, I had to continue to working, because we had some crises at the end of the sessions. So hopefully I will continue to be able to talk normally for the rest of today and throughout the rest of the week.

The reason why I was kind of lugging this thing around is just so that you could see the kind of props that I have been working with for the past year. Actually, I have gotten it down to just a notebook. On the floor of my office I have a notebook that is probably the fattest three-ring notebook I have ever seen. It's about that big. And that is the Administration's line in and line out of the Senate Acquisition Reform Bill, plus all of their point papers.

Then, of course, I have the Senate bill and I have the Bilbray Bill. Last week, Congressman LaFalce introduced a small business bill. And, of course, we have H.R. 2238, which was introduced by Mr. Conyers and Mr. Dellums and the Government Operations Commit-

tee, marked that up last July. That was only a 60-page version. Last week, the Armed Services Committee marked up their version of H.R. 2238, which grew in the ensuing months to a 300-page version.

So maybe that will give you just a little bit of an idea that acquisition reform has captured the attention of Congress, and we do mean to do something.

How I explain it to some people is, in many ways it seems, for some reason, that all of a sudden this year or starting last year, the sun and moon and the stars have all aligned together properly. We are finally going to do acquisition reform. We have been saying that we are going to do this for a number of years, and finally some people are going to try to do something. I don't know, as I said, if it is in the proper alignments in the heavens or what it is, but we are going to do something.

Just to give you a little bit of an idea of where we are going, I would like to describe for you what the markup was that we had last week on the Armed Services Committee and just give you a little bit of an idea of what is in our bill.

First of all, I have to stress that it is a bipartisan effort. Our chairman, Mr. Dellums, and our ranking Republican, Mr. Spence, felt that acquisition reform was too important to have it be a partisan effort, Democrats versus Republicans. They joined together and crafted this 300-page proposal. That means they did not get everything they wanted. Because unfortunately, or fortunately, on Capitol Hill, it is the art of compromise that usually, you know, wins the day.

As for industry, we looked at a lot of proposals you gave us, and we took a lot of proposals that you gave us. The administration came up with a lot of good ideas, and we took a lot of those ideas. But there were a lot of things that we had to put aside and that we could not do, just either for jurisdictional reasons on other committees' turf, or things that neither Mr. Dellums or Mr. Spence felt comfortable with tackling in this bill.

It is basically one of the most comprehensive Government-wide acquisition proposals that we have had in ten years, since the passage of the Competition in Contracting Act. Some people say that this whole effort started about four years ago. I think what you have to do is walk it back with what we did in those four years.

Four years ago, Congress realized that we were going to come to some sort of crisis, I guess, with defense budgets coming down. We were going to have to start addressing the rules and regulations and the laws that keep companies out of doing Government contracting. So they set up what is called the Section 800 panel, and that panel looked at about 600 laws that they felt were barriers to Government contracting, and they made a number of recommendations. Their report came out last year. So when you think four years, well, two of the four years were the Section 800 panel going off and doing their job. And then last year, they came together with a report, and we spent a year analyzing that report and putting together our proposals.

The real action is happening this year. And, in fact, today I know Andy Effron was originally one of your speakers. He cannot be here today because right now the Government Affairs Committee on the Senate side is marking up S. 1587. And the Senate Armed Services Committee marked it up this morning. So Andy is busy today.

As I mentioned, we took a lot of proposals. We consulted with the defense industry, with the Administration, with small businesses, and with other committees' jurisdictions. So we tried to craft a package that would help the broadest number of people, and we are probably not going to be able to satisfy everybody But our principal guiding objective behind the legislation was to strike a more equitable balance between the number of the Government-unique policy requirements imposed on federal procurements and the need to simplify Government contracting.

The proposal the Armed Services Committee passed last week would accomplish this objective through an increased reliance on commercial practices, goods and services. And to my fellow colleague on this panel, Phil Odeen, we took at stab at including commercial services; not just ancillary services, but commercial services in our proposal. And we will see how far we get with that, because we have to convince the Senate.

We also created a new category of low value federal procurements, basically raising the small purchase threshold from $25,000 to $100,000, and exempting both commercial items and those purchases below the small purchase threshold from a number of Government-unique requirements.

For members of our committee, clearly, acquisition reform is critical because of the downturn in the defense budget and the cost that it is giving us to maintain a defense-unique industry. We have to try to do more civil-military integration and a lot of what Dr. Denman talked about earlier.

The other thing that the proposal does is it extends to all the civilian agencies a number of the authorities that have been already provided to DoD, and we are trying to do a Government-wide procurement policy.

To give you an idea of what we have done, we did

commercial items. We are giving a preference to commercial items. That is defined as to included services, as well as a very complicated definition of what a commercial item is. I will be happy to answer any questions on that later. Plus we would exempt commercial item procurements from specific Government-unique requirements, such as some of the cost accounting standards and certification requirements and things like that, that we have been told are not done in the commercial sector, and they cause a lot of problems for companies wishing to do business with the Government. We have tried to limit flow down, those types of terms and conditions that are flowed down from primes to their subs.

The other area that we tackled is raising the small purchase threshold, renaming it to the simplified acquisition threshold, which is a better term for it, and raising that from $25,000 to $100,000, and again exempting those procurements from a number of special Government-unique requirements.

At the same time, because small businesses are very concerned about losing the visibility of contracts below a threshold, because they are not published in the Commerce Business Daily (CBD), we would mandate that there has to be some sort of electronic bulletin board. Ultimately, we would want a Government-wide data interchange system, where you cannot only receive notices but give your bid through the computer and receive payment through the computer and a host of other things.

We have named that federal acquisition computer network to try to give a feeling of something new. Everybody has in their own mind what electronic commerce means, what electronic data interchange means. So we want to try to come up with a new term, so we have called it FACNET.

We have also created a threshold for micro purchases, everything under $2,500. The local contracting officer can now just go to their local mom and pop hardware store now and buy a hammer, or go to Staples and buy reams of computer paper or something like that, without having to go through a number of the hoops just to do something under $2,500.

We have strengthened the debriefing and bid protest procedures, in order to try to stop the current practice of defensive protests. So we set out a whole process wherein you would receive notice of contract award and then get a period of time in which you would be able to request a debriefing, and then still file the protest if you feel that you really were screwed in the contracting process.

We have recommended raising the Truth in Negotiations Act permanently to $500,000. As most of you know right now, we are operating under a pilot program or a test program, which would die at the end of next year and return the TINA threshold to $100,000. We are recommending that it be permanently raised to $500,000 and make some exceptions for commercial items.

Those are the highlights of the bill. What I would like to do is just a couple of other comments. One, I guess I cannot get away without saying Congress has stepped up to the bat to try to do a comprehensive acquisition reform. As I have said already twice, we may not have gone as far as a lot of people want us to go; we may be going too far.

For a lot of members of Congress, acquisition reform is putting more rules and regulations on the books, not less. It used to be when I would speak to people, I would say, "You say the words 'procurement reform,' you are guaranteed 300 votes." I hope it will work for us this time around, because procurement reform used to address those $600 hammers and toilet seats and everything, and that is when we got all of these special rules and regulations. So we were getting the 300 votes. Now, I hope acquisition reform will mean 300 votes, and we can streamline and make the process more effective.

What we also now ask is once we pass the legislation and it gets signed into law, hopefully later this summer, we are going to turn the ball over to DoD and industry, and you guys had better implement it. We don't want to sit here in two years and have people come up to us and complain that they still cannot get into the Government market because of the rules and regulations.

Congressmen are going to sit there and go, "Well, gee. I remember this bill we passed a couple years ago that was supposed to undo that." So I guess our challenge then, is for the Government--not just DoD, but Government in general--and industry to step up to the bat and fully implement the authorities that we have given them.

There is one problem that we have run into in pushing acquisition reform, and that is perception. There is a lot of concern out there from a lot of groups, especially those who have lived off the Government trough, as to how this is going to impact upon them. Just to give you an idea of the types of concerns that we run into, we put into our bill a proposal that says that if a contract has not been closed within a year, the Government has to start paying interest penalties. Well, we started getting letters from mostly small businesses who

have said, "Wait a minute. Now you are hurting us. You are telling the Government they can take a year to close out contracts." And we are thinking, we are scratching our head, going, "Wait a minute. We used to hear from small businesses all the time, saying, 'The Government hasn't paid me five years. I'm going bankrupt because the Government hasn't paid me.'"

So this provision was aimed at trying to force the Government to close out a contract, give final payment, within a year. If they didn't do that, they are going to have to start paying interest. So we thought it was an incentive, something to help.

The companies clearly did not hear all of that or see all of that. So we are having to field a lot of phone calls, answer a lot of letters, explaining that one little provision that is only, maybe, like five lines long out of the three-hundred page bill.

But those are the types of things, people start hearing little things, and they are going to start calling their congressmen. So I guess all I can say to you on this is that this is a very fragile piece of legislation, and it can start falling apart as people start to pick at it, or if one group tries to get more and more and more, there will be another group over here that says, "But you're doing too much," and this could splinter and fall apart.

One last thing that we are worrying about is a process issue, and it is Government at work or Congress at work. We are having a little turf battle right now with the Government Operations Committee. Until that is resolved, this bill will not be going to the floor, at least as a separate bill.

We do have the Authorization Bill, however, that is going to be marked up next week. Next Friday, our committee is taking up the FY95 Authorization Bill, and within two weeks after that, we will be going to the floor with the FY95 Authorization Bill.

So if we cannot work our disagreements with the Government Operations Committee, our committee feels too strongly about acquisition reform and wanting to do something this year, we will put it on the Authorization Bill so that it can move through Congress and on its way to get enacted into law.

So that's about all I have to say. And, obviously, when we get to the questions, I will be happy to answer any questions on more of the details or whatever you have. Thank you very much.

DR. TOLCHIN: Thank you very much.

Our next speaker is Mr. Philip Odeen, who is the president and CEO and a director of BDM International, which is a $500 million corporation with a worldwide staff of 6,000 people in 60 offices.

He has spearheaded a number of initiatives involving acquisition restructuring and marketing. And under his leadership, BDM has become identified as a company best known for information technology and business in the area of software integration, computer technical services, enterprise management, and outsourcing.

Before he joined BDM, he was vice-chairman of Management Consulting Services of Coopers and Lybrand, a leading international auditing and consulting firm, where he also served as the managing director of their federal practice.

He has also kept a hand in Government as a member of a number of advisory groups, and he is currently a member of the Chief of Naval Operations Executive Panel and the Defense Science Board. He even had a panel named after him, the Odeen Panel, which assessed the Bush Administration's defense plan for the Clinton Administration.

He has been active in many other circles, and what intrigues me, also, is the fact that he was vice-president in his very colorful and distinguished career of the Wilson Sporting Goods company. We are talking about dual-use, remind me to ask you later about the new tennis racket that I am getting for Mother's Day, which is a made of composites that Dr. Denman was talking about, and why my tennis pro tells me it is more forgiving. I was afraid to ask him why I needed a more forgiving tennis racket. What exactly is it forgiving? But maybe it's better not to ask too many questions.

He has also served in senior positions with the Office of the Secretary of Defense, National Security Council, and even provided staff support to Henry Kissinger on a wide range of defense and foreign policy issues.

He is a native of South Dakota, graduated magna cum laude, and was a Fulbright scholar. Please joint me in welcoming Mr. Odeen.

REMARKS OF MR. PHILIP A. ODEEN
PRESIDENT, CEO AND DIRECTOR,
BDM INTERNATIONAL INC.

MR. ODEEN: Thank you very much, Susan. I should mention for Gary's benefit, when I was at Wilson--this is 20 years ago--we were leaders in experimenting with graphite shafts on golf clubs. That was really new and exciting technology at that time, and I suspect there was very little use of graphite at that time, outside of the defense sector. But it has been very successful. If you play golf, you know what a change it has made.

But anyway, thank you very much, and I look forward to making a few comments and then the chance to respond to questions.

I learned, as I arrived at lunch today, that I am supposed to be the spokesman for industry. As a result, I have had to restructure my remarks a bit to speak for my colleagues in the hardware business, as well as the services business.

The topic is implementation. Reflecting back to Cathy's comments about the planets being in some kind of alignment, I thought that was going to be true this year. I had high hopes that this is going to be the time for significant acquisition reform on the Hill.

If you have been in Washington as long as I have been, you realize that self- delusion is very important if you are to survive. I am still hopeful, and I am more hopeful after hearing Cathy's comments. I think the House Armed Services Committee has done a good job, but there are a lot of major impediments to overcome before that bill becomes law.

There are a number of reasons for this. This is not the time to go into all of them, but I think one of the problems--and I suspect Colleen talked about it this morning--is that the Administration simply did not give the Pentagon the backing they needed. It was just not high on their priority list.

This is unfortunate, but we must do the best we can, and hopefully we will come out with some useful legislation. As Cathy suggested, for the first time in years, acquisition reform might actually improve things, although perhaps not very much. In most cases over the last 10 to 15 years, the "reforms" have actually made things worse. So let's hope that we are seeing at least a beginning of a change in the right direction.

Fortunately, there is a fair amount that can be done without legislation. Some of the spokesmen this morning talked about that. There is a lot of positive potential for the Defense Department, OFPP, and the White House to have a major via changes in the FAR and the DAR. There are numerous of political impediments, and some of the things that are within their power will have a very high political price to pay. Therefore there are going to be limits, but there are significant things that can be done.

Finally, there is certainly an opportunity to improve the relationship between industry and Government. That relationship has deteriorated significantly over the last 10 to 15 years, but given the attention by the current DoD leadership, I am confident we can begin to change that. Again, thinking of Gary and ARPA, there is a very different atmosphere at ARPA and the way they deal with industry than in most of the rest of the acquisition community.

Before I talk about my specific thoughts on implementation, let me take a minute and suggest why this is so important. The obvious reason is that the procurement budget is collapsing. Today it is roughly $40-odd billion compared to over $100 billion just a few years ago. That is a dramatic change in our ability to provide new, more modern weapons and equipment for the military.

We can live within this for a few years because we have very substantial stocks of modern equipment, but that will not last forever. So we absolutely have to confront this problem. We have a few years to work the problem, but we have to solve it if we are going to have a modern military in the year 2000 and beyond. The issue is not just to preserve the defense industrial base. That is important, but the problem is much more fundamental.

We have to integrate the industrial infrastructure that supports the Pentagon and really tap significantly into the commercial industrial base, if we are going to have a strong military at today's level of spending, and modern, reasonably priced equipment. We cannot continue this independent, isolated defense industrial base.

This may sound like a radical idea, but it is absolutely essential to our national security. The defense industrial base is simply too small today to provide the flexibility, responsiveness, the expansion potential we are going to need some day when a crisis of consequence occurs. We must rely primarily on the commercial industrial base, which is far larger, and in many

cases more advanced technically, especially in electronics and software.

Finally, cost is a factor. As the defense industrial base shrinks, the cost of weapons goes up and up and up. You all understand the way the system operates. Smaller production runs means that prices get higher also a smaller direct base means higher overhead and higher G&A rates. Our ability to buy things is impacted all the more. The only was out of this quandary is to integrate the industrial base that supports the commercial sector with the industrial base that supports the Department of Defense.

This is not really a revolutionary idea. If you go back to World War II or Korea, you will find that the two industrial bases were in fact quite integrated, though I admit it was a lot easier. In World War II, we converted auto plants into tank plants and port facilities to shipyards, and we did it effectively.

We did it again in Korea. We had downsized our industrial base dramatically, but we were able to reconstitute it. If you go back to the 50's and 60's and even the 70's, you will find far more integration and far more dual use in the industrial base. The Boeings of the world did in fact build both 707s and KC135s, and there are all kinds of other examples of a true dual-use industrial base.

But that has, unfortunately, changed over the last 10 to 15 years for several reasons. First of all, during the 80's, defense funds were ample. If there is a lot of money around, you don't have to worry so much about efficiency, and we began to move away from that dual-use industrial base.

Secondly, we got into this period of excessive oversight because of overpriced hammers and toilet seats and the other scandals in the early to mid-1980's. This led to a series of new rules, regulations, reporting requirements, oversight mechanisms, and so on, which further separated these industrial bases. Today, in most cases, the defense industrial base is quite separate from the commercial industrial base and companies operate separate production lines and facilities. And this happened just at the time the dollars began to shrink dramatically.

These are some of the very pressing reasons why we have to solve this problem. And if we don't solve it, we are all going to have an impossible task supporting the recapitalization of our military forces in the early 21st century.

What can we do about this? First of all, let's hope that we get substantive legislation this year. It is incumbent upon all of us in industry to lobby and do our best to convince the Congress to make some changes that will really make a difference.

There are some elements of the draft bills that are of value, such as the $100,000 threshold that Cathy mentioned. Greater flexibility in buying commercial products will be helpful. More flexibility to waive regulations, pilot programs, things of that type, all will help. But for the most part, they only impact one relatively small part of the problem. They don't get at the core defense industrial base that is building ships and tanks and airplanes, the part that is separate and isolated.

These reforms will help, but I doubt that the changes are going to be broad enough to make much difference. It helps to get rid of a few impediments, but the thing that keeps the base separate are a whole range of other impediments, rules and regulations, and reporting requirements, and oversight requirements. Removing one or two or three impediments helps, but unless you get rid of a very large number of them, it will not make a fundamental difference.

Nevertheless, let's get as much as we can out of this legislation. There is a good chance that there will be something positive accomplished, as opposed to the kind of "reform" efforts that we have faced over the last 10 or 15 years. And hopefully, next year we will be able to pass added legislation that will make even more difference.

Secondly, we have to take a multi-phase approach. We have to go beyond relying on legislation and do the best we can by changing the regulations. Where there are waiver authorities, let's use them selectively to demonstrate that eliminating rules and regulations improves the acquisition process.

If Congress approves the pilot authority, let's use it wisely and effectively, again to make the point that it will make a real difference in the quality and cost of weapons and equipment that DoD buys.

I am confident the Defense Department--and hopefully they will get the full support of the White House--will be very aggressive taking advantage of current laws and regulations. I know Bill Perry feels very strongly on these issues. Colleen, spoke this morning, and she certainly is committed as is John Deutsch and other senior leaders. Assuming they have the support of the White House to make the changes that can be made under present authorities, a great deal can be accomplished.

And finally, we have to be more creative. Over lunch, we were talking about some of the other things one might do, maybe some more macro kinds of approaches. I was at a small dinner last night for senior member of

the House of Representatives sponsored by a group of defense industry leaders. We were discussing these issues and one of the points my colleagues in the hardware business were making in spades, was the impact and cost of oversight activities. Despite the facts that their work force is down 30 or 40 percent, the dollars are down 30 or 40 percent, the amount of oversight had decreased, very slightly, if at all, and in some cases had even increased. So despite a dramatic reduction in the numbers of people that they employ, the closing of plants, and a sharp cutback in the production volume, the numbers of oversight people had not decreased. Cutting them is not easy politically. To suggest that we trim back the IG staff or reduce the DCAA is not a very popular strategy.

However, a higher level approach might make sense. I would think you could convince the Congress that there should be a relationship between the numbers of people in the oversight activities and the amount of money being spent for R&D and procurement, or the number of people being employed in the commercial sector to develop and produce weapons and equipment. There clearly ought to be some kind of a relationship, and hopefully this approach might make a difference.

This Congressman was asking about how much money you might save, and the numbers are in fact significant. These are very rough back-of-the-envelope kind of numbers, but a Defense Science Board study I was involved in a few months ago indicated that in total there are somewhere between 300,000 and 400,000 people involved in the full cycle of the acquisition process. These are not just procurement people; it includes the DCAA, the Defense Contract Management Agency, the IG, and related administrative personnel of all kinds. In total it is a very large number..

Let's split the middle and assume that there are 350,000, and in total I believe procurement and R&D spending is down almost 30 percent. Procurement, of course, is down much more, over 50 percent, but R&D has been more stable. If you could eliminate a third of those people, about 100,000, you would save between $5 billion and $10 billion per year. That would make a very dramatic difference in the amount of money DoD could spend buying weapons and equipment. That would be a 10- to 20-percent increase in spending on procurement, a significant change. Perhaps this more macro approach would be more successful in convincing the leadership to focus on this problem.

Let me just close with one other thought. I understand that the Defense infrastructure issue came up in the discussion this morning. Cutting infrastructure costs is essential to the success of recapitalizing the Department of Defense. The infrastructure costs are going to eat us alive if we don't attack them aggressively. Despite a lot of cries of pain, we have made relatively little progress to date. There is a lot riding on the Base Realignment and Closure (BRAC) '95 effort. I just hope that all the services are aggressive and that OSD and the White House will support a very aggressive BRAC program.

The infrastructure issue goes beyond just cost. There is also an opportunity, and most of you have been reading about the depot maintenance studies, to provide additional support for the civilian industrial base. I am not only considering defense industry; in some cases the work might flow there. Work also would flow to the civilian industrial sector, which would be available to help the Department of Defense in time of crisis. In addition to employment, it would provide cash flow, and it would provide profits. Finally, I think it would serve to further integrate the defense and civilian industrial bases and provide more flexibility and responsiveness in time of war.

These are a few thoughts from a person that represents industry. I look forward to your comments and questions.

DR. TOLCHIN: Thank you very much, Mr. Odeen.

Our final speaker is Vice-Admiral William C. Bowes, who is the Commander of the Naval Air Systems Command. Admiral Bowes is a native of New York, a graduate of the University of Idaho and its ROTC program. He also graduated from the Naval Test Pilot School and received his master's degree in systems acquisition.

He served with many combat missions, including the USS Kittyhawk, the USS Enterprise, the USS Coral Sea. He flew combat missions over Southeast Asia and served with the VA-195 Dambusters as its executive officer and its commanding officer.

He is an experienced test pilot, who has had three tours at the Naval Test Center at Patuxent, and he has also been an engineering test pilot. He began his program management experience with the Naval Air Systems Command as the F-18 assistant program manager for systems and engineering. He was also assigned as the F-14 aircraft and Phoenix missile system program manager and managed that system and the F-14 from 1985 to 1987.

He was promoted to Rear Admiral in 1987 and was assigned as the director of the Cruise missiles project, and he was given additional responsibilities as the first director of the unmanned aerial vehicles joint project.

He was also the program officer for the Cruise missiles and the unmanned aerial vehicles joint project.

He is much decorated. His decorations include the Distinguished Service Medal, three Legions of Merit, three Distinguished Flying Crosses, thirty-six Air Medals, and two individual awards, eight Navy Commendation Medals, the Vietnamese Air Gallantry Cross, and various other awards too numerous to mention here. With great pleasure, I introduce our last speaker, Admiral Bowes. Thank you.

REMARKS OF VICE ADMIRAL WILLIAM C. BOWES COMMANDER, NAVAL AIR SYSTEMS COMMAND

VADM BOWES: Good afternoon, ladies and gentlemen. I am the last one on the docket, so I will be brief. Getting ready for this, though, I was thinking about a couple weeks ago, during the spring break. I had a chance to visit my youngest daughter, who just gave birth to a young one, and I was in the bedroom while her daughter was taking a nap. Looking down with somewhat inquisitiveness, amazement, somewhat disbelief, awe, my wife walked in behind me and put her arm around me and said, "Penny for your thoughts."

I said, "It's amazing that they can build a crib like this for $100." An acquisition guy all the way.

Well, it is a pleasure to be participating in this event this afternoon. It looks like you had a great agenda. I wish I could have been here to hear what Admiral Owens ended up talking about, and I know Colleen Preston and her panel gave you a perspective there. Now this is the panel that is going to talk about implementing the strategy and the challenges and choices.

I am certainly very hopeful, much as Mr. Odeen has been year after year, that acquisition reform is really going to come about. Cathy Garman's talk gave me some hope that we are going to see some changes for the positive. The 800-panel report, was a good attempt to identify a lot of needed legislation changes.

My concern--I'm sure all of ours--is that the socioeconomic needs the Congress tries to fulfill through defense procurement and federal procurement will still remain, and as long as we see things like Davis Bacon and Buy America and Small Business, we can never truly go buy commercial products to satisfy all our defense needs, as much as we try.

Those are the really big hurdles we have to get over. But so much of the acquisition reform, we like to blame the Congress, but there is so much we do to ourselves. If you read 5000.1 and 5000.2, and as I am sure the other services have done, we could do so much to improve our processes.

I am very encouraged by OSD's leadership. From the very beginning, this Administration has really tried to get people on board that understood the process. I have seen the people that Colleen Preston has hired, and she has gotten NAVAIR's best person, Ms. Donna Richbourg, who understands our business, to help decide what things need to be done.

Within the Navy Secretariat, Ms. Slatkin is certainly taking the initiative to start delegating things. I had my first ACAT-3 program assigned, for which I am the milestone decision authority, and more is going to come. Little things like that may not sound like much--I guess the Army had already done that--but we just need to start delegating more things down and start worrying about the cycle time of doing things, as opposed to the previous Administration which seemed to be too risk averse. Time did not seem to matter. Let's preclude every failing, and we will just throw cycle time out the window, never recognizing that time is probably the biggest element of cost in everything we are doing. I'm optimistic that real progress will be made, however, when you look at where we are today, it hasn't happened yet. All that's happened so far is we've had additional requirements imposed by the new administration, albeit they are small, things have stretched out.

The new administration is trying to learn their way, to understand who they can trust and how fast to go. I am optimistic that things will certainly improve.

Clearly real acquisition reform within the Department is based upon a better understanding of how the system works among all the participants and upon trust. Clearly the administration seems to be saying, "Let's go ahead and trust the program manager and let him or her go forward and execute their program. And we should help the Secretary to get rid of the barriers." That has never happened, but yet those are the words and the rhetoric that we hear. I am hopeful it really is a sincere intent to go ahead and do that. I am also hopeful that we are not going to see what has always happened in reform of the past, a cookie-cutter approach, that dictates how we have to do it for every program, as opposed to recognizing that each program has unique requirements and should be structured that way.

The other aspect that I am very, very pleased that

the new administration is tackling, is working requirements along with acquisition. You heard Admiral Owens talk today. He recognizes from the very top we can't separate, as some previous interpretation of legislation made us do (probably more than ever intended), the acquisition world from the requirements world. He recognizes that they need to be married all the way through the process.

In carrying on with the forum and the theme of this, implementing the strategy, what I would like to talk about now is what is the Navy's strategy for operating within this re-engineered acquisition system, or what are we doing to go ahead and change ourselves so that we can go ahead and operate within that system.

Someone told me a very good quote the other day, "Leadership really is recognizing what you are going to change and then making those changes." I think the Navy is out there leading the way on a strategy that makes sense and is relevant for the future. The strategy is a very simple one. I will talk about the Navy and then I will talk about my little world at Naval Air Systems Command and what we are doing.

The Navy is right-sizing, and that means closing significant parts of our infrastructure, so we can have a balanced tooth-to-tail, and we are paying a proportional amount for the infrastructure that allows the war-fighting elements for us to go to sea and operate at and over the sea.

At the Naval Air Systems Command, we are working in partnership with industry, and what that ends up meaning, is that we are only doing what the Navy needs to do and we are shedding ourselves of other things. That is not what happened in the 80s. In the 80s we grew so fast we didn't know where to spend the money in the Navy. I am sure the services started to do things we probably didn't necessarily need to do, but no one else was very interested in that business. Depot work is one of those areas in which we do much in-house that we clearly don't need to do.

We are focusing ourselves on life-cycle platform management, looking at every one of our systems across its life cycle. When I say systems, it can be a ship system or airplane system, to understand total ownership cost and managing it that way.

We are starting to say, "Let's look at a region." You may have heard the Navy's concept of regional maintenance. "Let's look at all the industrial facilities within a region." Electronics, pneumatics, hydraulics on a ship and a submarine and an airplane are the same. People continue to say, "Let's do all fixed-wing depots, and let's do all ground electronics depots, separate," when it is the same stuff. Obviously for the bigger vehicles, we are looking within a region. Let's go ahead and optimize what we have, eliminate the redundancy and let's look at common repair practices across all of our systems.

Specifically, let me show how that strategy the Navy is following applies to the Naval Air Systems Command. In 1991, I had 19 major sites across the United States, and a little over 55,000 people. We are downsizing now through BRAC '93 with a lot of major sites going away, and reducing manning to a little over 30,000 people. Significant change. Over a 44 percent reduction in people. The numbers of airplanes the Navy is downsizing about 24 percent and number of air wings by that same 24 percent. The naval aviation budget is going down about 30 percent during that point in time. We definitely took the initiative, reducing the number of the people and closing the sites, so we can operate with the minimum infrastructure that we need.

It obviously means depending more on the private industry. You have certainly seen our naval aviation depot strategy, which is very similar to the Defense Science Board recommendations, which says, do only what the Navy needs to do. Let's depend on industry for everything that we don't need to do to fight wars and let's be smart customers and define requirements and then enable ourselves to be smart operators and providers of support during the life cycle of our systems.

We are changing the entire way we run our acquisition systems. Those familiar with Naval aviation know that we have had a very strong matrix organization. There has been tremendous strength from a technical standpoint and all of our organization has grown up in many different field activities and individual sites that operated as individual sites. Every time you have an individual activity, it is a barrier. Every time you have an individual function it is a stovepipe, and you pay tolls every time you cross those stovepipes or cross those barriers.

We are changing our management style. All of our programs are managed now through integrated program teams--it is an evolution. We are going to have all the work done within an integrated program team. Naval Air Systems Command, downsizing to 11 sites, will be one command.

We are changing our whole thought processes, linking all of our people together among all of the sites, taking advantage of the information technology, so that we can go ahead and operate across the life cycle with

one program team. The program team is making the decisions as opposed to having to go outside.

Operating will be in a far more efficient fashion. We certainly are hopeful that the rules and regulations will change to enable us to not need as many people. As Mr. Odeen pointed out, the total numbers of people we have are downsizing. They are doing all the processes that we have because of lack of trust in the system and the tremendous amount of oversight we have and the tremendous amount of paper that we must generate to get a system through the acquisition process that we in DoD, together with the Congress, have created for ourselves.

The last area I would like to talk about, certainly on the aviation side, is jointness. We have taken it very seriously for the last two years in pulling together the Army, Navy, Air Force, and now we have the Coast Guard, the FAA and NASA in an organization--of which I currently am the chairman although I will be passing it to General John Cowings of the Army in a couple of months--it is the Joint Aeronautical Commanders' Group.

We have changed ourselves to an organization that looks at all the processes of aviation. We have our chief engineers, our chief logisticians, our heads of contracts, and those people in each of our respective organizations who work new programs in the program definition phase to get the processes the same. Four process boards, and the multiple sub-boards under them, now have the natural work groups within each of our services working together, so that we do things with common processes or by taking advantage of each other.

I could go on for hours and talk about the examples of how each of us, operating the same kind of system, has different solutions to problems that come up. For example the Blackhawk or Seahawk helicopters and how many repair of repairables contracts Sikorsky has with the Navy, the Air Force, the Army, the Coast Guard, as opposed to having one DoD contract. We are now trying to do things like that through our process team, Team Hawk, that we have put in.

Clearly we have a vision for the future. The vision for the future that we have is one that says: let's go ahead and downsize ourselves, right size ourselves into a leaner infrastructure. The Navy must continue to develop, acquire and support systems, but let's do it in a very efficient way, working in partnership with industry, in a cooperative way, and hopefully in partnership with the other services and agencies so we don't have redundant and unnecessary duplication of capabilities.

I look forward to your questions, and thank you very much.

AFTERNOON PANEL DISCUSSION

QUESTION: I am Scott Farnsworth from DSMC. My question is for Admiral Bowes. You mentioned that you had recently made a milestone decision on an ACAT-3 program. Has Ms. Slatkin made any move towards formally delegating down ACAT-2 or lower program milestone decision authority to PEOs and System Command Commanders?

ADMIRAL BOWES: I think she is in the process now of working and delegating down ACAT-3, which is a big step from where we had been before, where all ACAT-3s were down at the Assistant Secretary level. So this was the first of those that have been delegated to me, and I expect others will be shortly following.

QUESTION: Will they go into the Navy's version of the 5000 directive? When I say formal, is it going to be in writing?

ADMIRAL BOWES: I am confident that we are going to see, along with the acquisition reform that is going on in OSD, Ms. Slatkin has--or Evelyn Harshberger is heading her group that links right into the President's group on acquisition reform. So that is one of the many that

Ms.Slatkin is going to be implementing within the Navy. I don't know what form it will take, but it changes to 5000.2. I think we will probably wait to see what legislation comes out, what changes there are, and then there will probably be a sweeping 5000.2 change. We have not gone through the rewrite of 5000.2 at this point. That is one of the important ones that I know is coming.

QUESTION: This is for any of the panel members who might want to address it. I am Dave Gillette from ICAF. Pricing practices are sometimes a barrier to new manufacturing processes. Lean manufacturing is an example. We have heard from some industry leaders that our cost accounting methods can be a significant barrier to their adopting new practices. Lean manufacturing would have saved them and us quite a bit of money. Can any of you discuss that?

MR. ODEEN: Let me just make a comment on it. I think that is right. And there was a very interesting example in electronics. A company that produces radios

for the commercial aircraft industry was asked to bid on a particular Defense contract. They were told it was going to be a commercial-type procurement, and they weren't required to provide cost or pricing data up front. But then when the first contract modification came, they went through all of these issues of both cost accounting standards and cost or pricing data and all this kind of thing. The company just finally said they weren't going to play in that case. So that example has a little different twist than you asked. You were specifically addressing both the truth in negotiation and all the other legislation that is required and the accounting procedures required to ensure that compliance is there.

MR. GILLETTE: Cost accounting versus activity accounting is one of the big barriers I mentioned.

MR. ODEEN: I have heard case examples of companies that went to activity-based costing systems, which make a lot of sense. I mean, it gives a much better idea of what the real costs are. But in a situation like that, what you do, you have a lot of products. You end up having all kinds of changes in your prices. Some things go up and other things go down because you really change fundamentally the way you allocate costs.

In a situation like that, every time the costs go down the Government auditors come in and say, "Thank you very much; we will reduce your price." And when it goes up they say, "Sorry about that, we can't change the contracts." So it is really a lose-lose kind of situation.

There has been a lot of resistance, even though the head of Defense Contract Audit Agency says, "We will be flexible." It is a hard thing to do when you have a large bureaucratic organization. It is a real impediment to using very modern types of cost accounting systems that make a lot of sense. It is just too hard sometimes.

MS. GARMAN: I don't know if this exactly answers it. But just to give you an idea of what is in our bill; for commercial items we would exempt commercial item procurements from the requirement of cost accounting under the cost accounting standards board.

We also have some different types of requirements under TINA, the Truth In Negotiations Act, for commercial items, and we have eliminated the requirement for the price reduction too. We would keep in the Government's right to audit for only one year after contract performance or a date agreed upon by the parties upon contract award. But we have eliminated the price reduction clause.

The other thing is, under TINA we have tried to clarify exceptions to TINA based on adequate price competition or establish catalog or market prices of commercial items for services and prices set by law. In exceptional cases the contracting officer could waive TINA.

We took an additional step because we were told that even in those cases where you sometimes met the exceptions, the contracting officer would still require cost accounting data under TINA. We said basically, that if we met those exceptions, you can't ask for it. So maybe that will help a little bit. We will see how far we go with this.

MR. McLUCKEY: John McLuckey from Rockwell. Just as a follow-up to the waiver of flow-downs on commercial. Being a multi-industry company; and we happen to be one in the aircraft side too where in fact we have commercial divisions, do you know if that legislation is going to cover a waiver of flow-down of requirements if the subcontractor is an entity within a corporation?

MS. GARMAN: Yes. There are two things that our bill does. One is for the commercial item. Just in the definition, we cover intracompany transfers, so if you are transferring in-between your divisions it is considered a commercial item.

Then regarding the flow-down the bill would specifically say that these would be any divisions, subsidiary or affiliate of a prime contractor. But the caveat is, other than a division, subsidiary or affiliate that is the prime contract.

It is hard to explain, but there is a concern that if a company wins the contract, then they are subject to a lot of these things on the prime contract level. So they will just give it all to a division and say, "This is a division over here, and therefore we don't have to comply at the contract level."

So what we are trying to do is eliminate flow-downs but still make sure that a company that wins the contract is covered. I probably didn't explain it very well, but we are trying to cover a case like Rockwell. But we are also trying to address the perception issue too.

QUESTION: My name is Walt Uhler. I'm a corporate ACO with the Defense Logistics Agency. I have two comments and a question addressed to Mr. Odeen.

You might understand the difficulty of this oversight issue when our agency applauds us when we get what is called a return of investment on $20 million when we have a contractor agree to return $20 million when they have been found in noncompliance with the cost accounting standards.

Secondly, you made a point, and it is a very good point, that maybe the oversight should be reduced commensurate with the reduction in the defense activity.

We have a problem in that we have many things from the 80s that we still have to clean up yet. We argue that for that reason we can't have a commensurate reduction at this point.

Finally, my question to you is, what happened to CRAG?

MR. ODEEN: I don't know what CRAG is. I don't know a lot about that, I can't answer that one. I have not been contacted by my companies. But let me try and answer your first one. To be realistic, there is not much chance we are ever going to get away any time in the near future from cost accounting standards and those kind of things for a purely defense industry. I think that is a way of life for the divisions of Rockwell that are building aircraft components for the military and so on. I think that is a fact of life, and those kind of things are going to happen.

I suspect there will be recoveries, but the hope would be that you can begin to get away from commercial items and flow-down to subcontractors and all this sort of stuff which really does limit the reach you have, and also begin to let you buy things. I think the legislation that Cathy was talking about will let you buy some things that really are basically commercial products. They don't mean just hammers at the hardware store, but things that are sold, but variants of things that are sold on the commercial marketplace. I think in those areas there is a potential to make a big difference.

But if you are a Martin or a G.E., engines are trying to work on some things there and there is a real potential, I think, to really get away from some things. I think that is going to happen. And you are right. You get applauded and you get awards If you aren't doing these things. All the incentives are to be conservative and to ask for things whether you really need them or not.

Again the point that was made whether cost or pricing data are required, you are always safe by doing it. So all the incentives now work that way. And the mere fact that you can get a waiver to not do something doesn't help a lot because it takes a lot of courage for somebody to decide to go after that waiver. Not only courage, but time and energy and effort to get through the process.

So the incentives still go the wrong way. So, I think that is the hope, that some of these internal changes over the next year or two will switch some of those incentives. The classic case being the mil specs where they are talking about requiring you to waiver to use them. That really does change the whole balance in terms of making the decisions.

QUESTION: Paul Sewell from Lockheed. I have a two-part question. One is, what will an RFP look like if this act passes as is? How different will it be from an RFP that we know today? Do you expect the driving at the industrial sector to a single-dual use type of format, to proceed to the point at which commercial companies will compete with major military primes for development contracts?

DR. DENMAN: I think the answer to the last one is yes. Obviously in many of our systems the military primes have had many years of learning curve, not only in production--but I am mainly talking about technology. So I don't expect to see some wholesale movement and shifts in that regard. But certainly the objective is to open the system to allow companies that are today only in the commercial marketplace but have product lines that are very related to military lines. I expect to see them compete. So I think the answer to the question is yes.

In terms of what is an RFP likely to look like, let me answer that in the context of my business at ARPA. Perhaps Bill could address it in a broader context of acquisition. As I mentioned, we are every day now writing agreements--we call them agreements to avoid confusion of the term contract. They are in a legal sense contracts, but they are not procurement contracts. We don't send out RFPs. We don't even send out what is normally called a BAA. We just put an announcement in the Commerce Business Daily and wherever else. We spread it around. We put it on the Internet. So we are operating outside of all those sets of rules.

Obviously I use FARs and all the other rules as guidelines, because I can't just be out there in sort of never-never land. But one of the concerns I have is that as we move towards doing this in some hardware program, as I mentioned, a high altitude UAV, for example, I am very concerned.

We are going to put an announcement out that says we are looking for a commercial-type proposal in the context of systems and subsystems as well as the overall performance. There is only one inviolate requirement, and that is the cost of the system.

I am concerned, because this is one of the first steps out of the block in reform, whether the industry is going to be able to respond to that. I mean, Lockheed, or pick your favorite company, isn't going to put in an activity-based cost accounting system just to run this ARPA program. So there is a legacy business system issue here that I don't find being addressed very much.

I am concerned about that because I intend to be on the edge of some of this. I am very concerned about how we get over that barrier of the legacy of what we

have to grab something new. That is just an answer from sort of a business experiment point of view, not a total acquisition reform.

ADMIRAL BOWES: With respect to the RFPs, I would think they are not going to change very much. We will see the same RFP, the same basic stack of clauses that are required by the FAR at the back, maybe a few that are not going to be required, depending on what acquisition reform is passed. Then, depending on how OSD implements specs and standards, we will see a statement of work in that part of the RFP that refers to what it is that you describe and that you want to buy, and that will be formatted similarly.

We are working with the aviation side of the Air Force and the Army, to have one standard type of RFP--so it would be more the same. If you look at each of the services, they are so different. There is no reason that they are different. And we are working at that. That will be an evolution to get them looking more similar, which will be just easier for industry to communicate with the Government.

QUESTION: A question for Ms. Garman. I'm Vincent Grimes from National Defense Magazine. How do you avoid creeping re-regulation or knee-jerk regulation when you get the $200 toilet seat or $700 hammer? Those legislative packages seem to go through a lot quicker than does acquisition reform as we are talking about it today. How do you bring discipline to 535 Congressmen and Senators?

MS. GARMAN: That is a concern that we do have. The first time we have another scandal, we are going to be back right where we started with all their laws. I want to stress "laws" rather than rules and regulations. Those are DoD's problem. We make take a two-page bill and then they turn it into a fifty-page regulation. So the laws are something we are going to have to try to watch. But I guess, totally off the record, what we have joked with some people in industry is, the first person who gives us that $600 hammer, we're going to string them up. And maybe that will be a nice little incentive to the rest of the industry not to do it again.

You have 535 members of Congress, and if they have a constituent who comes to them with another $600 hammer or whatever, we are going to be there fending off yet another law or whatever. If I am still there in 20 years--hopefully not--I might be able to fend it off.

But we may have a new generation of people who won't have gone through the agony of versing acquisition reform. So this will be a brand new topic for them, and they will look at acquisition reform, as I said earlier, in a totally different light.

I guess it is going to be a two-way street. We are going to have to ask Government and industry to monitor themselves too. People who are going to want to break the law are going to break the law no matter what we do anyway.

DR. TOLCHIN: I am going to interject a question here for panel. I would like to ask about anti-trust reform, or lack of anti-trust reform, and how that affects the topic that we are discussing this afternoon. I want to throw it open to the whole panel, and especially to Dr. Denman, because it seems to me that ARPA has been so innovative in encouraging consortia, encouraging companies to work together.

I was very surprised at the Republicans who kept talking about anti-trust reform, but really weren't able to accomplish that. Was it Congress's fault? Was it lack of leadership from the White House? I am not sure myself, but I would like to know how it affects your business, and I can throw it open to the whole panel.

DR. DENMAN: Well, at this point I haven't found any necessarily serious impediments. I mean, there is a certain environment in which we try to stimulate competition. We certainly have run into a few cases, particularly in the communications side. The AT&T breakup left certain terms and conditions from Judge Greene that continue to be somewhat of a problem.

But there is an environment of anti-trust that inhibits certain dialogue from taking place. I don't personally find it to be a major impediment. Perhaps we are going to face some major issues as the industry continues consolidation in terms of retaining competition. I forecast that to be a more serious problem in the anti-trust as consolidations continue into the future.

MS. GARMAN: The anti-trust issues were something that was a concern to our members a couple years ago. Congressman McCurdy chaired a panel called The Structure of the Industrial Base. He, in his report, noted that mergers and acquisitions were a problem.

Unfortunately, mergers and acquisitions or the laws pertaining to mergers and acquisitions is not in the jurisdiction of the Armed Services Committee; it is in the jurisdiction of the Judiciary Committee. We did not feel that we had enough time or the expertise to go beat on the door of Congressman Jack Brooks, the Chairman of the Judiciary Committee, and ask that he do something in changing or revising anti-trust laws.

We did take a little stab in the area that we do have jurisdiction over, and that was the Department of Defense. One of the proposals that is in our bill would basically say that the Secretary of Defense shall con-

duct a review of any proposed acquisition of a business concern that is a critical United States Defense supplier and communicate his review and his findings to the Attorney General and to the FTC.

So at least from a Department of Defense point of view we are trying to give a little bit of a prod because a lot of these companies do impact on the defense industrial base and the mergers and acquisitions obviously apply to DoD getting supplies. We feel that DoD's voice needs to be heard. So in our little area we tried to do something, but we can't change the laws in general.

ADMIRAL BOWES: Certainly I think that the hands-off approach that the Department has taken so far has certainly served us well. And as to the current mergers that are ongoing, I think our future is dependent upon that continuing.

The biggest concern I have is with regards to the security aspects and foreign mergers or buyouts that end up occurring in technologies that impact our national security. We obviously have our hands tied in those to some degree. That is the biggest concern I have.

MR. ODEEN: The anti-trust has not been a big problem with the mergers thus far, but as we get fewer and fewer suppliers and larger and larger entities, it is going to start becoming a big problem.

I am making up something--but when Martin-Marrietta decides to merge with McDonald-Douglas, can't you imagine the uproar? It is one thing to take Grumman and smaller, kind of second-tier companies, but when you start having the first-tier companies starting to think about merging, I think you are going to have major anti-trust problems. That is an interesting public policy question.

DR. DENMAN: Phil, I would assume you agree that the country doesn't need seven or nine air frame contractors.

MR. ODEEN: Absolutely not. That is what is going to get hard to make those mergers.

DR. DENMAN: We are paying for it, yes. That has to change.

QUESTION: I am Bill Bonmaier from the Defense Systems Management College. This morning Ms. Preston talked about raising the threshold for small purchases from $ 25,000 to $100,000. Then we heard from Ms. Garman, and she talked about the Federal Acquisition Computer Network. Two questions. Is there going to be an investment requirement for small businesses for this? And also how are you going to do this, through Internet? How is this network going to operate? Do you have any ideas on some of the specifics on how this will actually perform? There may be other members of the panel who may want to also address that.

MS. GARMAN: Regarding our Federal Acquisition Computer Network, we are trying not to do what Congress is usually accused of doing, and that is micromanaging. What we envision is a Government-wide type of computer network that basically a small business would be able to tap into. A system , sort of like Prodigy or something like that, but there would be a value-added network. The departments would plug in their solicitations into this value-added network and then the company can subscribe to Prodigy or whatever they feel would give them the adequate information and then be able to get the information out of the computer.

We envision a single face to industry. We don't necessarily envision that the Army, Air Force, and Navy will have the exact same system or that the Veterans Administration will have the same system as DoD. But what we would try to envision is that it will all get hooked up and then there would be a single face to industry.

We are not computer experts, although we recognize that the technology is out there. We can pay our income taxes via the computer, why can't we give solicitations under $100,000 via the computer?

Colleen also had put together a process action team, and under that, within two years, 80 percent of DoD's activities are supposed to be up and running on a full-fledged electronic data interchange system. So we are encouraged by what DoD is doing. And in fact DoD is probably the most forward leaning in this area. Getting GSA or some of the other agencies on board is going to take a little bit of prodding.

As far as the investment of small business, it should just be a computer and a modem and subscribing to one of these things like Prodigy or whatever, which probably 99 percent of them already do. In this day and age, a business person, really ought to own a computer and probably most do. An individual may not have to own one. As a business person they probably already subscribe to something. So I don't envision for a small business person that this is going to be a huge investment.

QUESTION: My name is Anne Howe, and I am with the GAO. I attended the markup. I have a question for Cathy Garman. I was wondering if the problem with the bill was on a substantive issue or on a procedural issue between the House Armed Services Committee and Government Operations Committee?

MS. GARMAN: The Government Operations Committee did order a bill reported, last July, H.R. 2238,

which is what we marked up last week. Their proposal, as I mentioned in our comments, was only about 60 pages long. So if you compare it to what we passed last week, it is a rather insignificant piece of legislation. It was, at the time of its introduction, and Mr. Dellums co-sponsored it, intended to be just a first step in acquisition reform. It was supposed to have been intended as a piece of legislation that we would pass quickly, within weeks of its introduction in February of last year. So it probably should have been passed by May of a year ago. The Government Operations Committee took a little bit longer than that. By the time they finished, it didn't seem to make sense any longer to go with a first step and then do something bigger. So we basically just waited, and when it came our turn to do H.R. 2238, we began working on the comprehensive package rather than just passing H.R. 2238 as it was, because that would just add confusion to the process.

The issues with Government Operations are internal discussions between the Chairman on process and how it is going to be handled on the floor and conference status and things like that. I don't feel that it is my place to comment on internal discussions of the handling of things going on between our two Chairmen.

There are some substantive concerns, and we have not yet sat down with Government Operations Committee to discuss some of their questions or concerns about the bill.. We have had one brief discussion with them, and overall this is a very positive package as far as they are concerned too. They just have a couple of things that they would like to sit down and talk with us in areas that are more within their Committee's jurisdiction. And we will hopefully be doing that prior to going to the floor, so we can iron out any differences at that point in time and our bill can go to the floor under a kind of bipartisan, bi-committee and whatever else you want to call it. We will be all one big happy family when it gets passed by the House.

DR. TOLCHIN: That sounds like something we can look forward to, doesn't it?

QUESTION: Dr. Johns, ICAF faculty. I want to follow on to the question about reversing the regulations, decentralizing again and going back to a lot of rules and regulations and oversight that could occur. The response was that when we have scandals, that will occur.

Let's take something less black and white like a scandal, and look at something like the C-17, which we used as a case study here. A very ambiguous situation, where people used judgment. Some people considered it a scandal that ruined careers. That left a big overcast on project managers thinking about trust and confidence. It seems to me that most of the reform legislation now, is dealing with moving toward a broad market so that you have more buyers than sellers, where something approximating a classical free market will regulate cost and quality. But that doesn't address these pure military unique industries, where you have probably a monopsony and a few oligopolies selling.

Those systemic pressures are still going to be there on project managers. And I don't see anything addressing it. I hear people talking about more trust and confidence, but no programmatic efforts to build trust and confidence. Someone said we want to convince people that, " we are going to walk where we talk." But other people say, "I don't see that, and they are not going to get my trust, as a program manager, until I see some further evidence."

Probably there is no one here, other than the Navy, that would represent what you are doing within the Navy. I would have liked to ask this question of Colleen Preston this morning. But would you address that? It seems to me that you are not addressing that facet.

ADMIRAL BOWES: Well, take the C-17--or you can pick the A-12 or you can pick any of those--and you can go back to the accountability of the people that make the policies that say," you will you use fixed-price development programs regardless of what the cost estimate is." Now, you put the program manager in that environment. You are almost forcing the system today, to have military people as program managers, to a great degree, because the rules make it impossible to ever get anything through. It is incredible that we get anything through the system because of the rules that almost make it impossible to do things. So you get can-do military people that are out there taking risks and making things happen despite the rules. Because, if you follow all the rules, you can't do anything. So you find out, okay, we will go ahead and get the thing through.

Then we have very foolish policies that say with development programs there is going to be fixed price. You go look at the A-12, the C-17, the problems that you end up having there. How do you live within the realities of the environment?

If you know the C-17, well, the contractor still needs to get money to perform. It isn't like there are other customers. He is building it just for you and the cost is pretty high. So actions occurred that we ended up criticizing after the fact. But if you look at the broad spectrum, the environment in which that team was forced

to live, it certainly made it near impossible to go through unless you didn't have any problems. And that is what development is. It is problems. How do you manage those problems?

I think the biggest thing that we have done is we have gotten out of the fixed-price environment for development. We are structuring programs today, but not with the cookie-cutter approach. Surely within the Navy--where we started the fixed-price world it seemed for development and then let's get dual sourcing and do all these things--there was a standard way you build a program and every program had to be built that way. We are just recovering from those programs now that ended up either being canceled or had significant cost overruns or losses on the part of the contractors. So I think that is the biggest single thing that we are doing.

MS. GARMAN: I would like to put in a plug for our piece of legislation we passed three years ago; the Defense Acquisition Work Force Improvement Act. That is addressed at training and professionalizing the acquisition work force. I think that is a very significant piece of legislation to empower the acquisition work force.

We are taking it a step further in this legislation and extending it Government-wide. I think that is a pretty significant thing. Jim McMichael is here, and he has been doing a super job of implementing that. I think that it will help a lot as well.

QUESTION: I am Henry Jehan. I am an Army student at Defense System Management College. This question is probably best answered by Ms. Garman. This morning in the sessions that we had there was discussion about the Buy America Act. And there were two specific scenarios that were discussed.

One is where a contractor brings in parts from overseas from various places, assembles it in the United States and then tries to sell it. He can't, because the piece parts equate to more than 50 percent of the system. But a foreign company assembles it overseas and brings it in on Reciprocal Trade Agreement, they can sell it as American product.

The second problem, that was discussed in the same general discussion is, you have a manufacturer who puts together a system that has foreign components in it. And as a whole system it is an American product and we can buy it, but then when that component breaks and we have to go back for reprocurement for maintenance, we can't get it because it is now a foreign-procured item.

Is there any provisions in this new law that you are working on to address these problems? And if so, what?

MS. GARMAN: Yes and no. Buy America is probably one of Congress's sacred cows. It is very difficult to address the Buy America Act in a proposal like this, because it is something that a lot of members feel very strongly about, especially members from the Midwest who have workers who have become unemployed because of challenges by foreign companies. Every year ,on our authorization bill ,we always get one or two Buy America provisions. It is also a jurisdictional issue in the sense that it is a shared jurisdiction between the Government Operations Committee, which is Chaired by John Conyers of Detroit, Michigan, and the Ways and Means Committee, which is Chaired by Dan Rostenkowski of Illinois. So those are two members who don't necessarily see an interest in changing the Buy America Act.

The administration was pushing for a change in the definition, so that we could use the definition that is under the Trade Agreement Act--substantial transformation. I don't know if it is in the Senate bill, it is not in our bill. We have taken a couple of very small steps in our bill. One, under the micro-purchase threshold, we would except micro-purchases, from the Buy America Act. Because if you are buying a pencil, it doesn't matter where that lead came from. Or perhaps that computer that is $500. Do you really need to worry about where each of its components came from? So anything under the micro-purchase threshold would be exempt from the Buy America Act.

We have also, in the flow-down section of our proposal, said that the prime contractor has to live up to the Buy America Act, but it cannot be flowed down to all of his subs. This also goes for the DoD--what we call Baby Buy America in Title Ten. So basically the Title Ten provisions related to Buy America and Buy America in general would apply, without being flowed down to the subcontractors.

The other thing is under the small purchase thresholds. I believe, in that we have exempted purchases under the small purchase threshold from the Baby Buy America, the Title Ten stuff. So we are taking baby steps to try to do something, but, unfortunately, all we can do is what the members that have these jurisdictional interests, will allow us to do.

DR. TOLCHIN: It sounds like a subject for another panel, doesn't it? In any case, I want to thank my panel for their very thoughtful and well considered comments and for their presentations.

RADM SMITH: When you come to the cleanup hitter, you really need someone who has authority and experience to put one over the fence. In this case we

are calling on a player who has played every position. Jack Gansler, whose association I value, is a man with experience in industry, a man with experience in Government, a person who continues his academic involvement, and an author.

He has served as a member of the staff of the Secretary of Defense and the Office of Defense Research and Engineering, and later in the office of the Under Secretary of Defense for Acquisition.

He is currently Senior Vice President and Director of The Analytical Sciences Company (TASC). He is the author of Affording Defense and The Defense Industry, two textbooks used at ICAF. He is a visiting scholar at the Kennedy School of Government at Harvard University and a visiting professor at the University of Virginia.

His most distinguishing feature is that he is an honorary faculty member of the Industrial College of the Armed Forces and has been coming back here year after year, trying to get the message across to the students on the necessity for certain types of reform in the acquisition process.

It is an honor to welcome Dr. Gansler back to a very familiar podium.

REMARKS OF DR. JACQUES S. GANSLER
SENIOR VICE PRESIDENT AND DIRECTOR, TASC

DR. GANSLER: What I thought it would be appropriate to do, is to put today's discussions in perspective in terms of the implementation part. The critical issue, of course, for implementation is understanding why you are doing it and then being able to help sell that to the Congress, the Administration, the DoD, and those in the system who have to change in order to be effective in the implementation.

So I am going to provide a very brief overview of that. The point of my talk is this: what is required is a transformation, not a marginal adjustment.

What is the purpose of the Defense acquisition process today? In the past we would have said the purpose is to build the best weapons in the world and we have succeeded in doing that. Today the challenge is threefold. We must build the best weapons in the world at much lower cost. Secondly, we must have an effective, innovative, responsive defense industrial base; without dependence on a worldwide proliferation of weapons. It doesn't mean that FMS is bad; it means we don't want an industrial base that is dependent on foreign military sales. Lastly, and this is probably the one major new initiative of the Clinton Administration, we must figure out how to use the $100 billion or so of defense R&D, production, and support dollars in order to simultaneously aid the economic growth and industrial competitiveness of the nation, rather than be in conflict with it. The combination of these three issues is the challenge that we have in transforming the industrial base.

The easy out for this solution would be to stop building weapons. I think you heard from the military side today that clearly is not a viable solution. There are weapons we have to build, whether they be a new antiballistic missile, or global surveillance, or whatever. The challenge is to do these things at much lower cost, obtaining them from a broad industrial base that is flexible enough to be able to do it at low cost and with high quality, and still maintain technological superiority.

The problem, as you all know, is that today's defense acquisition process doesn't build new weapons at low cost, with high quality, and with high performance. It builds weapons that achieve high performance but that cost too much, take too long, and lack sufficient quality. Also we have what the economists would call, "a sick industrial base." That is an economic term, not a pejorative one.

When I talk about the industrial base, what we have all been talking about today, is not just the big prime contractors, but also those at the lower tiers supplying critical technologies and skills. Those, not just in the private sector, but also those in the public sector, and the balance between those two. I would highlight one characteristic that we haven't emphasized, although you did hear Admiral Bowes mention it, namely that all sectors aren't the same. I would argue strongly that any acquisition reform initiatives must recognize the enormous difference between, for example, building ships and building electronics, or service industry versus aircraft industry, and so forth. Many of the reforms are going to require greater flexibility to recognize the differences between the industrial sectors, if we are going to be successful.

I want to list some of the current problems in the defense industry. I think you are all very aware of what some of these major problems are. The excess capacity, and therefore the huge cost resulting from it; the lack of, and growing disincentive for, R&D capital investment; the fact that many world class companies are leaving defense or refuse to accept defense contracts--

like Hewlett Packard which will not accept defense R&D contracts; a growing dependence on foreign sales; our falling behind commercial state-of-the-art, is perhaps one of the biggest fears in maintaining our technological superiority; and the growing isolation of the industrial base, with its lack of surge capability.

The political reactions to these problems of the defense industrial base are such things as paying $3 billion more for another submarine that the Navy may not have said was essential, and introducing protectionist legislation. For example,one requiring all equipment (parts as well) to be built domestically, happened to be a law that was passed both in the House and the Senate, but (luckily) in different years. Had it been actually passed the same year by both of them, you would have been guaranteed that the $100 billion we now spend on weapons acquisition would have all gone to supporting the defense industry. We would have gotten no equipment out of it, because the cost of having a domestically-based plant to build five of one part, and which were not state-of-the-art, would have been prohibitively expensive. Fortunately that didn't go through.

Another political act is the support of public sector industrial facilities, labs, depots, arsenals. and Federally Funded Research and Development Centers. I don't want to be pejorative about this, but some people refer to this as "the nationalization of the defense industry." Laws are now being passed that say you can't make the effective tradeoffs between the public and private sector, you must do it all in the public sector.

Finally a large amount of money, around $1 billion, is being authorized for "defense conversion"; largely, to ease the transition out, for the people who are being impacted by consolidation in the defense industry. All of these are essentially short term, without any long-term perspective or vision of where we are trying to go within the defense industrial base, in, say the year 2010.

If I were to ask you, what would you like to have in the year 2010 for the defense industrial base, you would undoubtedly list certain characteristics, such as: world class systems' performance, assured access to state-of-the -art technology, lower cost, higher quality and shorter product realization cycles; flexibility and adaptability to unpredictable changes in technology and geopolitics; and rapid response to crisis demands. I think overall we all accept that, that is what we would like to have from the U.S. defense industrial base. Most people are increasingly becoming convinced that the only way to get this, in an affordable solution, is through some minimum capability in defense-unique areas, but with the overwhelming share coming from a world class, commercial (dual-use) sector. Basically this is the argument that Secretary Perry has documented in his recent policy statement.

This is a challenging transition from today's industrial base; where we see an isolated--in fact increasingly isolated--defense industrial base. Firms, a large number of them, over the last few years have actually separated their commercial and military operations. For example, Boeing separated their military and commercial transport business in Wichita--because of cost accounting standards requirements. Hamilton Standard just recently separated their businesses. TRW has done it. Others like Motorola--world class companies--simply have plants down the street from each other that are not integrated. What we would like to have is an integrated operation--where it is hard to tell where it begins and ends. But there will still be some defense-unique portions left--some in the public and some in the private sectors. The point is, on those defense-unique ones, we still have to change the way we do business.

I would like to have you think about what it means to be "defense unique." The biggest mistake, we tend to make, is to think of uniqueness in terms of products, not in terms of processes. A defense electronics item is unique in doing a certain mission, say electronic warfare. On the other hand, the process for building it, and even the subsystems and the elements in it--most of the chips and parts and so forth--are dual use. If you can build that on an integrated electronic line, where the ten we buy of that defense item, and the thousands we buy of a commercial item, were integrated, you would still have a defense-unique item, but built in an integrated facility.

Now carry that beyond electronics. As someone pointed out, electronics isn't the only thing we buy. Take cannons for example. There is no commercial use for cannons. On the other hand, the rotary forge that builds them is identical to the one used to build railroad car (freight car) axles. The process is the same, and so the integration can take place at the plant level.

It is primarily going to be in the weapons system integration, assembly and test areas, that you are still going to have uniqueness left. Here we have to figure out what it is we will need in the year, say 2010, in terms of the prime and lower tiers, and then use our R&D and procurement awards to downsize efficiently to that. I think the answer will remain some mix of public and private, although I would argue, that those areas that are in the public sector should in fact be those which are inherently Governmental and/or are truly unique. That is the way the law tends to read today;

although there have been a lot of other laws like the 60%/40% rules (for depots) and others like that which don't follow the general intent, and which allow the public sector to compete with the private sector. This is not the traditional American economic system. Lastly, I would argue, defense-unique operations should be greatly minimized and where we have them they should be multi-product.

Now, the rationale for civil-military integration has been covered by many of the speakers, so I don't think I have to go into it. It is maintaining the state-of-the-art. It is cutting back on the overhead, through volume absorption. It is taking advantage of the high volume civil demands to get low cost and high quality; and so forth. Primarily it is this flexibility and adaptability provided by a much larger defense industrial base. One that can offer surge, or if necessary, reconstitution. If you are using the much larger base, then you are simultaneously affecting economic growth and competitiveness. But as Gary Denman emphasized, and it is absolutely essential that those investments are being made for defense purposes. The low cost and high quality is a defense need. The fact that it helps the U.S. economy is a secondary, but important, consideration.

Earlier, someone raised the question about the Air Force (sic) in the Spanish-American War, so I thought I would highlight here the obvious fact that there have been some technological changes since that time. If I had been standing up here even 15 years ago, I would not have been able to argue for civil-military integration. It is the major technology differences today that allows you to have civil-military integration.

If you look at the critical defense technologies (from the DoD list) and the critical economic competitiveness technologies from the Commerce list,, you find about 80-percent overlap. Next, if you buy a car today, you find a chip hard-mounted to the engine block. It actually has environmental specifications--this little computer--that exceed mil specs by a 10 degrees temperature range.. It cost the buyer an order of magnitude less, and is an order of magnitude higher in quality. Those are the commercial items the DoD must utilize. However, all commercial stuff is not good stuff. You have to use ruggedized, high-quality commercial items if you are going to be able to satisfy military needs; and that will require a lot of good engineering and management judgment.

Third, the shift from mass production to flexible manufacturing, really allows integrated factories. Prior to that, it would have been impractical to suggest these different products--a military-unique product and a large--volume commercial product--be built on common lines. The direction manufacturing is going in the commercial world is towards efficient production in small quantities. The Japanese are moving toward efficient production in quantities of one. These trends are very compatible with the military needs, and that is why flexible manufacturing allows civil-military integration.

Lastly, the electronic information exchange is now being implemented between firms and between industry and the Government. This will allow you to have integrated electronic operations. The thing that the DoD must do here, with the Computer-Aided Acquisition and Logistics System (CALS), is to keep it commercial; so that, in fact, they can integrate with the commercial industrial base.

Unfortunately, when people talk about civil-military integration, the instant thought that they often have--and in fact the one that is the focus of current legislation--is on buying commercial parts. That is the step that will have the least impact on the DoD, in terms of dollars. Perhaps 20 percent of the total acquisition dollars could be commercial items. The large dollar impacts are going to come from buying defense-unique items from commercial operations and, even more important, and probably essential in order to end up with integrated operations and greater use of commercial equipment, is that it be designed in. That is what Gary Denman was talking about when he discussed dual-use R&D. It is what they (ARPA) did, for example, in the MMIC program, where the gallium arsenide devices were required to be low cost and high quality, not just maximum performance. So they are now being used in both commercial and military sectors, and the DoD has the benefit of the low cost and high quality from the dual-use operations.

The combination of these three--dual-use equipment, dual-use factories, and dual-use R&D--are what we talk about when we say "integrated operations." The obvious place to immediately begin something like that would be at the lower tiers of the defense industry, where 50 to 70 percent of the dollars of most weapon systems are actually expended.

To do this, as you well know--and as has been stated all day--requires a dramatic transformation of two things. The first is how the DoD does its business; and the second is the structure of the U.S. defense industry. They are obviously totally interrelated, but you have to look at it from both the demand and supply sides if you are going to transform this activity. Bill Perry has stated, and I certainly strongly believe, that this has to be the

number two priority of the Department of Defense. The number one priority, obviously, is restructuring the forces to the post-Cold War era. But the number two priority, if it is going to get the right attention, has to be this total acquisition reform.

There have been a lot of defense conversion studies done. In fact, I just finished a book looking back at the historic cases of World War II, the Korean War, Vietnam, and current cases on defense conversion, from the industrial side and from the Government side. What can industry do, and the Government do (to help), and what are the barriers to defense conversion? As you know, it has been a very dismal story. The actual statistics show that, historically, it was something like only 25-percent success for a "conversion" of operations. A better term than conversion would be diversification and integration, because that is what we are really arguing for here, not full conversion.

Now, if you actually look at diversification in a commercial plant today, one trying to come up with a new product, it has about a 50-percent probability of success. What we are talking about is figuring out ways to get to something like a 50-percent probability of success for defense diversification--from the 25-percent of today.

There is a growing amount of data that indicate if you follow the lessons learned from the prior success stories--and there have been, obviously, 25-percent successes--what you'll find is that you can greatly raise your probability of successful diversification or conversion. What those success stories show is that the greatest bottleneck to conversion is senior management, in either the industry or the Government. In fact, some people say that the place you have to start is by plowing under the management. Either you convert them or you get new ones. If someone in authority has a mindset of continuing to do business the way we have historically done it, the company will not change. Next, finance and marketing are sufficiently different, between the sectors, so you probably have to have two different activities. But the data shows that the majority of defense work, namely manufacturing and engineering, can be relatively easily converted. You teach them how to worry about cost, rather than just performance. In commercial business you have to be cost-driven. In general, conversion is very time consuming and difficult. Mostly what it takes is sustained leadership. I will come back to that in a minute.

The barriers to integration have been well identified. Lots and lots of studies have been done on it. What is often overlooked is that the most important of the changes--and the biggest barrier today--is the military "requirements process," specifying what it is you need without concern for how much it costs.

A simple example. We obviously need a next-generation ballistic missile defense system. It was high on the list of things that came out of the Persian Gulf conflict. If we simply say we want a better one--the current one costs around $1 million each--based on historic data, the next one will cost $3 to 5 million each. An alternative is to say, "I want a better one at lower cost." That is what the commercial world would do. That is what they have demonstrated can be done. If you then introduce cost as an engineering consideration, you will drive yourself toward using commercial parts, commercial practices, and integrated plants wherever you can--particularly at the subsystem level.

So having to introduce cost as a military requirement is the critical barrier to overcome. The next three areas, 1) cost accounting, 2) mil-specs and standards, and 3)procurement practices, have been clearly identified--through asking firms like Motorola, "Why do you keep your two plants apart? What is it that you have to change in order to put them together?" Thus, these top four barriers to integration have been well identified.

The other one that always comes up is the military raising their logistics concerns. That doesn't come from the industry side; it comes from the military side with issues such as, "They won't be around in 20 years when we need them; we can't count on them in wartime." What has to be done is to rethink the logistics process which we now have, and is quite old. It is basically a remnant of the World War II type system and it must be modernized. There will still be some organic capability required, but the overall results will be dramatically improved. For example, consider Caterpillar parts. In the Persian Gulf, it took the Army, with the organic system to support the parts, in the range of 40 to 60 days for resupply. Caterpillar, for those identical parts, guarantees delivery anywhere in the world in 2 to 4 days, or they pay for it. There ought to be a way we can start to use modern logistics information systems and support systems, rather than the way we now do it. That is a major issue that we need to come back to, and that certainly addresses the question of total reliance on depots and full organic support as well.

There was a good discussion this morning about the fact that we now truly have a crisis. I believe there is no question that we have a crisis today. This is a necessary but not a sufficient condition for a transformation.

The one reason I have optimism that the defense

culture can be changed is when I look at the U.S. commercial industry and see what they have done to transform themselves into world class competitors. You look at the lessons that they learned in going through that transformation, and you say, "Can the DoD, can the Government, make similar changes?"

The first thing is to recognize you have a crisis. If you don't, you won't make the change. The second thing is having leadership that wants a change. We now have that very clearly in terms of Bill Perry and John Deutsch. We have to set a vision. Bill has now put out a document that defines the vision--the one I just went through.

Next, the successful firms focused on transforming the system to make direct support to the users. This is probably the hardest one, and we haven't gotten to it yet. I would argue we are probably at this point now in the system. We are still not focusing as much on the user as we are on maintaining the infrastructure. I think we have to recognize that the fighting man has to have a feeling that acquisition reform affects him or her; and they must go tell the Congress that, if we are going to make the successful change. The system has to be restructured to get the four-day response, rather than the fifty-day response.

On the industrial side, what is required is applying the lessons learned from successful firms for their transformation--for their diversification. The most difficult part, is that you know there is going to be enormous resistance. So you have to fully work at it.

In a lot of discussion today, there has been this question: are we now going to pass a law which will take care of acquisition reform, versus a process that is going to take a number of years, of which this law is only the first step? It is clear that it is a process that has to continue if we are to overcome all of the built-in resistance.

I think we heard today about a number of initial steps--and I emphasize initial--that are being taken. Bill Perry put out a statement of intent. Also, there is a conscious effort to implement portions of the Panel 800 recommendations in order to be able to simply buy commercial items. A necessary, but not a sufficient set of conditions. In fact, many of the things you would like to do to achieve plant integration would be covered by the implementation of the Panel 800 recommendations. Unfortunately, all of those aren't being put into the law.

There is the Project Action Team on Mil-Specs and Standards that should come out soon and would significantly shift the focus. You'll have to justify the use of mil specs. It doesn't say you eliminate them, but you must justify using them, instead of the other way, we now have, of justifying the commercial ones.

We have some pilot programs proposed which are important first steps; and we also have some really major service initiatives. I think it is extremely important, to recognize the fact that maybe 80 percent of the required changes could be done within the regulatory flexibility that is now available. My personal opinion is, that in the last Administration the services were well ahead of OSD in trying to take a lot of these initiatives. They have built up some experience and some initiatives that they now are being encouraged to implement. I find that extremely positive. You heard about some of those from each of the services today.

Lastly, there is a set of efforts now underway to look at major sectors of the defense industry--like jet engines, software, and micro-circuits. There is a Defense Science Board report due out next week in this area and there is an Air Force report on the micro-circuits. Now people are starting to go to the next step and start looking at other industries, like the space industry. The combination of these are very critical initial steps. Now we just have to go on to the next steps.

Congress can be easily blamed--as a cop-out. However, Congress clearly does have to be sold. The people who have to sell it are the Executive Branch and the industry. Now, as Phil Odeen mentioned, the Executive Branch hasn't been overly cooperative. They have given nice speeches, but they haven't told the Labor Department, the Veterans Affairs, the Small Business, et cetera,--all those special interests--that they have to line up along with the Vice President's statement. That is an essential step, and it has to be led by the DoD.

I would argue it has to be even led by the war fighters, in order to convince Congress that this really is essential to our nation's security. On the other hand, industry can play a major role here in identifying the barriers, and with the Government, defining the steps that have to be taken.

I want to follow up on Colleen's point; namely that industry also has to convince Congress that this is important to the nation. That has not been happening, and I believe I understand why. Because a lot of defense industry people frankly feel threatened by this. Many of them are not competitive. They can't compete with those world class companies. Many defense firms are starting to get their act together, but there is a lot of resistance within the defense industry, in the same way that there is a lot of resistance within the built-in institutions within the DoD, who feel threatened by these changes.

All of that institutional resistance has to be overcome. I would argue that the war fighters and the industry giants have to take the lead in convincing the Congress. There is no question that Bill Perry is going to do that, but he needs a lot of support in doing it.

Five specific changes, that many people indicated were the things to do, that came out today. These included: 1) cost as a military requirement; 2) limiting the applicability of commercial waivers to not just commercial items but to commercial facilities, so that we can integrate them; and 3) making industrial specs and standards the norm: 4) not passing down the unique defense requirements to the lower tiers; and 5) use the flexibility of the non-legislated regulations. These are probably the most essential first steps in order to start moving and to begin opening up the system.

I feel this will be a very challenging period, and I think you agree. It is a twofold effort. First to change the way defense business is done. That is the Government's side of it. From the industrial base, a new vision, a new restructuring of the defense industry. Putting those two together requires strong, flexible, and sustained leadership.

That is the challenge for those in the audience today. What we should be doing is going out from here today thinking that this is something that has to be done. It is not an option. It is not something you might want to do if you can.

We have a crisis and if all of us don't take a leadership role, it is guaranteed not to change. There is enormous resistance. But it is the right thing to do, and I think the results will be worth the effort. I hope you will help.

Thanks a lot. Go do it!

CLOSING REMARKS

RADM. SMITH: Thank you, Dr. Gansler. We have probably heard the definitive speech on the process--that reform of the defense acquisition system is not an option; it is an essential part of resolving the crisis.

I thank all of you for attending today. I think we are all taking away a bit of a challenge. I used to work for Max Thurmond, and the idea when you worked for him was, that if you brought a monkey into the room, that monkey had to go out on somebody's back--probably your own, but no monkeys were left. That monkey is on each and every one of your backs as you leave today. You are a part of solving the problem.

For the students from the Defense Systems Management College, welcome aboard ICAF and take that monkey home. You guys are figuring out how to solve lots of these problems. For those of you who are ICAF students, we have two more months to make world burners out of you, and this is part of the challenge you will have. For those who came here from Government and from industry, it is important that the specific parts of the problems be heard, and brought before the people who can solve them.

I would like especially to thank today the two organizations who made it possible for us to put this on. First, the American Defense Preparedness Association--General McInerney and his crowd, including Colonel Bailey, who was the Action Officer,and General Eicher--who helped put this together. We appreciate the work you put into this. Secondly, the Association of the Industrial College of the Armed Forces. It is our benevolent protective organization and we appreciate them.

In particular I need to recognize Colonel Steve Thacher who is a former program manager. This has been his program here at ICAF as an ICAF faculty member, putting together our support in this process. Without his continuous work for the past three months and his 24 hours-a-day work for the last week, this wouldn't have happened.. Thank you very much, Steve, I appreciate it.

Thank you all for coming and good day.

APPENDIX A

BARRIERS

to

Defense Acquisition Reform

(It's not for lack of ideas...)

"If you are waiting for top down direction and a sophisticated strategy for the future, you will wait for a very long time."

---Robert B. Costello

Eddie Bair
ICAF
21 Nov 93

The summer and fall of 1993 were to be watershed times for meaningful defense acquisition reform---the rolling back of "nonsensical" defense acquisition statutes, regulations, practices and, ultimately, attitudes! Many key indicators seemed to point in a positive direction:

* strong and committed OSD leadership
* an Administration marketing government reform
* Congressional sensitivity to the restructuring of our industrial base
* industry's examples of unbusinesslike practices (adding costs)
* the realities of a rapidly shrinking defense budget
* a national strategy in transition from Cold War (pro-Defense) to "New World Order" (domestic socio-economic) focus

Yet, OSD seems unable to harness these positive vectors into a lasting, systemic reform strategy---a tremendous window of opportunity being dissipated---WHY?

The aim of this paper is to identify the problematic <u>institutional barriers</u> to successful acquisition reform, in terms of the major players on the field. It is my premise that only by recognizing and understanding these prospective institutional barriers, can we ever hope to craft executable strategies for systemic acquisition reform.

BACKGROUND

The DoD acquisition system is perhaps the most studied, analyzed and criticized operating system of the Federal government. It seems like forever there has been a continuous call for "far-reaching" reforms. And, after almost 40 years of, "experts" are still recommending reforms to improve and increase the efficiency of the DoD acquisition process. The enduring problems cannot be attributed to the lack of ideas for reform! What has been missing is an EXECUTABLE strategy to make fundamental, systemic changes. With the Section 800 panel work, the Defense Science Board work, the reduced Defense budgets, the recognition by industry that change is essential, the realization by Congress that defense contractors are increasingly balky about Defense administrative "requirements", and involved OSD leadership, we appear to have a unique opportunity to break free of the incremental strategies of prior reform movements

and we could develop lasting systemic reforms. The arrested implementation of previous reform efforts was no accident---the biggest impediment was not legislative (as most parochialists clamor), but rather cultural and perspective within the institutions in the process. And so too, the current opportunity is in jeopardy of being lost for ignorance/nonattention (be it intentionally or unintentionally) of these institutional barriers.

THE BARRIERS

The primary institutional participants to effecting meaningful acquisition reform are the EXECUTIVE branch (to include DoD), the LEGISLATIVE branch, and INDUSTRY. Conversely, they represent the mightiest BARRIERS in striving to implement acquisition reform! And, it is necessary to recognize that each of these INSTITUTIONS AND THEIR SUBCULTURES contribute (or detract) to the viability of effecting a coherent, systemic acquisition reform strategy. Simply put, it is not just the statutory enactors fault, but rather the inability of OSD to understand and pay attention to the institutional cultural components for a successful strategy and their acumen in navigating such "barriers" to acquisition improvement/reform.

Executive. Ask a DoD acquisition practitioner what needs to be reformed most, and you will generate a cacophony of diverse solutions. The current Reform movement was created as a top-down (OSD) azimuth commitment, but not a (DoD) congealable resolve as to the substance of reform warranted. Within DoD, the service departments are operationally separate and jealously guard their distinctive missions and programs; as well as OSD seems to perceive the need to exert centralized control and management over the defense acquisition cycle. Although all parties will agree that "reform" is necessary, THERE ARE PERCEIVED ACQUISITION CULTURE DIFFERENCES with particular emphasis on job/mission security. In separate discussions with a PEO/DPEO from each service, there was a unanimous sentiment that there still exists an ongoing struggle for process "control", not only within DoD but within each service itself. So, **the focus of "reform" depends on where you sit**! Generally speaking, given OSD's crusade-like leadership, they captured a vision commitment on reform necessity; however,

services differences over the whats and hows are yet to be dealt with---an INTERNAL INSTITUTIONAL BARRIER.

Notwithstanding this, where this Reform strategy did smack into a barrier was in its inability to formulate an Administration consensus and a practical priority to seeking external action. On both fronts, OSD misconstrued its strategy and as a result will suffer in the short term for sure, if not jeopardize the entire momentum.

(A) Defense acquisition reform is an ambiguous, arcane and conflictual issue which offers few national payoffs of recognized visibility. OSD's package was too much for the Administration to absorb (in such a short time) and hype, not readily translatable into simple political rhetoric (e.g., quantifiable budgetary reductions) and never consensualized across the executive agencies---in short, OSD failed to build an executive branch coalition! As a result, in the competition for the Administration's legislative agenda, OSD's systemic reform initiatives package was overtaken by the NPR agenda, and OSD's approach was carved down to "soundbitable" increments.

(B) As a result of being subsumed within the NPR agenda, it is now compressed into a political priority between the Administration's invested prestige/credibility and Congress's headlong rush to recess. The candid assessment of one HASC staffer is that either something small will be enacted, before Congress recesses, as a political expedient with minimal inclination to revisit in the next session (acquisition reform is not a major issue for the House at least, because of its lack of understanding); or, nothing will get done pre-recess and the Administration's political agenda next session is health care with little inkling for acquisition reform---neither result a strategic objective systemic reform can survive! This time around, OSD's strategy would have been **better served advancing its Reform package on its own timetable**...

So, all the barriers to reformation do not reside with the Congress as many would champion...

Legislative. Certainly a major participant in potential acquisition reform is the Congress, generally perceived as the primary barrier to successful reform

movements.[1] However, as a policymaking body, Congress is not a monolithic entity either, and displays the characteristics[2] of its members:

* bicameral, with different constituencies and procedures,
* representative, esp. where ethnics and localism are concerned,
* decentralized for formulating policy reviews/decisions, and
* reactive, mirroring public perception of problems.

And, each of these characteristics represents REAL BARRIERS for OSD to cope with.

Bicameral. The Senate and House jealously guard their prerogatives and resist intrusions by the other house---an INTERNAL BARRIER parroting OSD and the services! The Senate seems to deliberate and work in a more systemic nature and framework; hence its ability to generally "embrace" OSD's package (assuming one accepts a common denominator of the 800 panel report). The House, conversely, is more sensitive to protecting local socio-economic interests, and, thusly has already evidenced strong misgivings about repealing any distributive equity laws aimed at providing a maximum number of companies access to public funds (while also mandating maximum accountability in the use of those funds!).

Representative. Generally speaking, politicians gravitate toward issues that are electoral visible, salient and solvable. Acquisition reform doesn't neatly fit any of these conditions; and, therefore is not major topic for the American public nor is there a lot of enthusiasm, either, in Congress for such a mundane and ambiguous issue. However, when a constituent calls and expresses concern of discrimination, fraud or waste Congress reacts! Ergo, CONGRESS'S general involvement with DEFENSE ACQUISTION is an ADVERSARIAL one fraught with NEGATIVE perceptions coming in. The attendant reaction to this negativism has been to proscribe additional laws for both greater accountability and increased oversight, not relaxation or elimination as reformists aim.

Decentralized. Policies are typically considered INCREMENTALLY or PIECEMEAL, reflecting committee and subcommittee jurisdictions. The structure of a given policy depends on which committees have jurisdiction and how positioned they are to promote the policy. Witness such in response to the Section 800 report, the HASC determined that only those elements that were solely defense-related would be addressed in the committee's deliberations. Clearly,

OSD's strategy needed to recognize and consider this BARRIER, e.g., slower paced, educating various key committees as to interdependencies, presenting balanced impacts and benefits.

Reactive. Congress is essentially a reactive institution. At any given moment, representatives are seldom far ahead or behind the views of their constituencies.

> "When decision rests on the consent of the governed, it comes slowly, only after consensus has built or crisis has focused public opinion in some unusual way, the representatives in the meantime hanging back until the signs are unmistakable. Government decision...a belated reaction to change."[3]

Unfortunately, as expressed earlier, acquisition reform is neither an issue with the public nor a crisis (yet).

A **belated recognition** of these **legislative barriers** was recently made by the DEPSECDEF:

> "...it must be remembered that it took decades for the barnacles to accumulate on the acquisition underbody and it would be foolhardy to believe that those barnacles can be instantaneously removed..."[4]

Industry. Industry itself represents the third major institutional barrier to acquisition reform. An immeasurable amount of harm has been done by a highly negative public and Congressional perceptions towards the defense industry (e.g., survey indicating 70% of public believes contractors routinely overcharge[5]; recent McDonnell-Douglas costs billed expose). A typical complaint of government personnel is that contractors tend to hide problems and turn in progress reports that are misleadingly optimistic (e.g., A-12, C-17, T-46A are extreme examples). There is a public perception and mistrust that industry exerts too much influence over the Congressional committees and DoD responsible to oversee and execute Defense spending.

The defense industry is not a monolithic structure amenable to generic remedies either (see executive and legislative above for parallels!). It is a HETEROGENEOUS collection of sectors, tiers and INTERESTS, which will be affected by reform in different ways. Industry activists and interest groups regularly offer diagnoses and remedies for reform; however, their proposals tend to be either sector-unique (e.g., aircraft v. electronics v. helicopters), or, heavily on parochial interests such as increased progress payments, relaxed ceilings for

reimbursements, and depot maintenance contracting out. Some of industry's proposals are justifiable; however, its agenda is disjointed, parochial, and does not address the full spectrum of all participants' interests comprehensively (anymore than OSD's or Congress's...hmm...).

SUMMARY and RECOMMENDATIONS

The basic issue addressed by this paper is the recognition of institutional barriers to reform are perhaps more ominous to deal with than all the exciting ideas of how to reform: that our past practices and cultures have ill-prepared us to recognize the magnitude of the challenges before us to systemic reform.

In order to attain real and lasting progress, OSD must begin the process of breaking down the traditional ways of doing business. **Fundamental institutional cultural changes are needed**! There are compelling reasons to appreciate the need for patience in reformation; not the least being the sheer power of bureaucratic cultural inertia.

The following recommendations emerge from this analysis:

* work among the major institutional players to build a CONSENSUS for reform OBJECTIVES
* any reformation proposals must be evaluated and merits decided upon with the SYSTEMS APPROACH
* defense acquisition reform should be undertaken as its OWN AGENDA
* creation of a oversight body to periodically ensure CONTINUITY in purpose and objectives, because fundamental reform WILL TAKE 1-3 YEARS to successfully craft, evaluate and implement

The most critical element of OSD's strategy, and the element that is absolutely essential to its success, is the need for a **consensus** on acquisition reform objectives **and** the **willingness to break down** the **institutional barriers** of old habits, interests and actions.

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ENDNOTES

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APPENDIX B

FLEXIBLE MANUFACTURING: THE ANSWER ?
THE POSSIBLE ROLE OF FLEXIBLE MANUFACTURING IN DEFENSE SYSTEMS

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The defense technology and industry base (DTIB) is a crucial element of US military strength because it provides the capability to develop, produce, and support military systems in peacetime and to respond to additional military requirements in crisis or war.

John H. Gibbons, Director OTA, 1991

Introduction

Few would argue with Dr. Gibbons that the defense industrial base plays a critical role in sustaining our military strength. A declining defense procurement budget has caused concern over our nation's ability to maintain that base in the future (US Congress: 3; Kitfield:41; Velocci:27). Secretary of Defense, Dr William Perry, believes the solution is to integrate the defense industry into the commercial industrial base (Kitfield: 41). This would allow the military services to leverage commercial markets. However, industry leader, William Anders, argues that integration won't work because of the unique characteristics of defense procurement (Velocci:27). In response, integration advocate, Jacques Gansler points to flexible manufacturing as the solution to these challenges (Gansler:26). Is flexible manufacturing the solution for the future defense industrial base?

In this paper, I'll evaluate the value of flexible manufacturing to defense procurement. I'll begin by first describing what flexible manufacturing is and identify its advantages. I'll examine two strategies for its application to defense systems. Finally, I'll explain why I would recommend DoD adopt one of the strategies.

Flexible Manufacturing

The definition of flexible manufacturing has evolved since the first system was patented in 1965 (Young:7). Arthur D. Little, Inc., defined flexible manufacturing in terms of the equipment:

Flexible manufacturing is a group of CNC (computer numerical control) machine tools linked by an automated materials handling system, whose operation is integrated by supervisory computer control. Integral to an FMS is the capability to handle any member of similar families of parts in random order. (Young: 8)

Since then, American manufacturers have learned that the automated machinery is only one aspect of flexible manufacturing. Successful flexible manufacturers must integrate the automated machinery into a management philosophy and corporate culture. As stated by the Association of Manufacturing Excellence:

The strategy of flexibility cannot take root unless the environment is right. Companies are regarded as the network of people who compose them. Flexibility is something that people do. (Davidow:133-134)

Manufacturing expert Paul Swamidass believes that manufacturers must tightly integrate technology strategies with the manufacturing work force, the organizational design, and human-resources practices (9). To be effective, flexible manufacturers must drop hierarchial structures and set up cross functional teams that include supplies and customers (Blass:28). Thus, flexible manufacturing means more than just automation. It's the adoption of an overall philosophy. If a manufacturer implements flexible manufacturing, he has a lot to gain. Flexible manufacturing offers many advantages. They include:

1) **Improved productivity** (Fife:24). A review of average manufacturing plants using FMS shows average sales per employee of $200,000 compared to the manufacturing average of $141,000. (Swamidass: 68-69)

2) **Wider range of customers and more markets** (Swamidass: 68-69). Flexible manufacturers can offer a wide range of custom, semi-custom, and standard products (Blass:28).

3) **Higher profit margins.** Flexible manufacturers can price their products at a premium and secure higher profit margins (Honeycutt:3). Since their products hit the market first and are custom made, they set their own prices.

4) **Unsurpassed product quality** (Blass 28) Manufacturers achieve better quality whether measured by product defects or customer satisfaction. Manufacturers have achieved "6 sigma" consistency (Fife: 24). This is near zero defects. Also, flexible manufacturers can tailor the product to satisfy the specific customer needs.

5) **Reduced time to market** (Blass:28). Because they integrate design and production, flexible manufacturers can make design changes in days rather than months. Average fabrication time is six weeks compared to sixteen for non-flexible production (Honeycutt:2-3).

6) **Flexible manufacturing capacity** (Blass:28) Because they produce a variety of products on the same equipment, flexible manufacturers achieve economies of scope. They can afford to produce smaller lots and vary lot size depending on customer demand. They can switch between different products quickly and efficiently. They don't rely on economies of scale to make a profit.

7) **Improved internal/external customer satisfaction** (Blass:28) Flexible manufacturers have found that forming product teams led to increased job satisfaction. Providing custom products quickly at a reasonable price has increased external customer satisfaction.

Thus, flexible manufacturing offers the opportunity to gain a competitive edge by opening markets and providing higher profit margins. Similarly, the military services could benefit from its application in the defense industrial base.

Flexible manufacturing could provide several characteristics desired for the future defense industrial base. Table 1 lists the desired characteristics of the future base as identified by the Office of Technology Assessment.

Table 1
Desired Characteristics of the Future Base (US Congress:8)

Ready access to civilian technology
Advanced research and development capability
Continuous design and prototyping capability
Good, integrated management of research, development, and production (reducing development time)
Limited, efficient peacetime engineering and production capabilities in key defense sectors
Responsive production of ammunition, spares, and consumables for theater conflict
Healthy mobilizable civilian production capability
Robust maintenance and overhaul capability

First, flexible manufacturing would provide ready access to civilian technology. Flexible manufacturers could produce defense products on the same lines as they produce commercial ones. Therefore, defense products would take advantage of advances in production technology. They can include the latest developments of commercial products.

Second, flexible manufacturers already integrate research, development, and production. Design and prototyping are an integral part of the whole manufacturing process. Flexible manufacturers can't really separate these processes. Therefore, DoD's meets its need for good integrated management of research, development, and production. The ability to prototype and design goes hand-in-hand with this integration.

Third, flexible manufacturing firms could provide surge capacity and the initial mobilization capability. Flexible manufacturers can switch from commercial-military mixed production to exclusive DoD production during crisis and war.

Finally, flexible manufacturers could contribute to maintaining a robust maintenance and overhaul capability by providing custom-made parts "on demand". Since flexible manufacturers can vary the quantity and features of products, they could provide a supply line to support maintenance.

Therefore, flexible manufacturing could provide many of the desired defense industrial base characteristics. However, there are some requirements that it can't meet.

Flexible manufacturers can't meet all the unique requirements of defense systems. For many military weapons systems, there are no comparable commercial products. For example, there is no commercial market for nuclear submarines or weapons. Flexibility has its limits even for flexible manufacturers. The products flexible firms produce come from the same assembly line and therefore must share many production process characteristics. Therefore, flexible manufacturers will not supply unique-technology systems.

In addition, there are some advanced technologies, such as stealth, which have no apparent short term commercial application. As pointed out by David Clelland, "Americans have a low tolerance for casualties so there is a drive for technology to reduce casualties at the sacrifice of economic superiority" (Clelland: 29-3). Therefore, DoD will have to continue to fund unique technological developments. If there is no apparent commercial market for them, DoD will have difficulty interesting flexible manufacturers. Thus, flexible manufacturing does not provide the whole solution for the future defense industrial base.

Despite these limitations, its clear DoD can gain from getting flexible manufacturers to produce defense products. But recognizing the benefits of flexible manufacturing is only half the issue for the DoD. DoD must also promote flexible manufacturing in the defense industrial base. In the following section, I'll propose two alternative approaches and examine their advantages and disadvantages.

Alternatives for Implementing Flexible Manufacturing

One approach DoD could take is to let the "market forces" drive the change. In this approach, the military services continue "business as usual". However, because the procurement budget is declining, fewer companies will be able to survive as purely defense contractors. They will either have to diversify into the commercial market or shut down. Several of the defense-concentrated firms that have already diversified have done so by adopting flexible manufacturing approaches (Parker:18, Grant:29, McGrath:29). At the same time, industry analysts predict more commercial firms will transition to flexible manufacturing

to stay competitive (Fife:21). Thus, "market forces" in both the defense and commercial markets will drive more firms to adopt flexible manufacturing. For certain defense products, particularly components and parts, the DoD would reap the benefits of these "market changes" while still maintaining its ability to meet unique DoD acquisition requirements.

This approach offers an advantage to DoD because it requires the least changes within the acquisition system. This avoids having to overcome political obstacles to acquisition reform. As Anser Corporation researcher, Dean Rhoads points out, defense acquisition is subject to intense scrutiny by Congress and the American people (DSMC, A-2). Besides having the responsibility of meeting defense materiel needs, the defense acquisition system has the responsibility of protecting public resources and rights. DoD cannot make changes to the system without gaining the support of Congress. As a result, changes that make sense from an economic or operational perspective may not be possible from a political perspective. Thus, if the DoD can get the market to drive the change to flexible manufacturing, then it wouldn't have to overcome the political obstacles.

Another advantage of this approach is that the DoD would not have to sacrifice military capability. DoD would not compromise military requirements for the sake of compatibility with the commercial processes of flexible manufacturers. Operational capability would remain the premier requirement in a defense acquisition.

Unfortunately, this advantage would carry a heavy price tag. DoD would pay to maintain defense industry that met unique requirements. This means this approach would limit the application of flexible manufacturing to only those components and parts that are compatible with commercial fabrication without compromise. This will limit the benefits the department can gain from flexible manufacturing.

There are other drawbacks. As stated earlier, this approach makes as few changes in the defense acquisition system as possible and rely on the market forces to drive the adoption of flexible manufacturing. There are certain aspects of defense acquisition that these market forces can't overcome. The current defense acquisition system will act as a strong deterrent to flexible manufacturers.

The obstacles to the adoption of flexible manufacturing in the current DoD system are the same obstacles that stand in the way of integrating the civilian and military industrial bases. Table 2 summarizes these obstacles as identified by the Center for Strategic and International Studies (Bingaman: ii). In flexible manufacturing, these deterrents are even greater. They conflict with some fundamental aspects of flexible manufacturing.

Table 2

Deterrents to Flexible Manufacturing in Defense Acquisition (Bingaman: ii)
Elaborate and expensive cost accounting requirements and staff
Restrictions to the use of commercial procurement practices and long-term supplier relationships
Government policies on contractor technical data rights
Specialized process specifications, quality assurance and inspection requirements

In particular, current DoD cost accounting standards (CAS) make flexible manufacturing and defense acquisition incompatible. Because they integrate and produce multiple projects for multiple customers on the same assembly line near, flexible manufacturers cannot easily implement DoD cost accounting procedures. A flexible manufacturer could produce a DoD product one minute and a commercial product the next. It would be extremely cumbersome if not prohibitively expensive for him to breakout the cost data for that one product.

In addition, flexible manufacturers have different overhead costs than the ones for which the current cost and accounting standards. The standards are more in tune with a mass producer than a flexible producer. For example, a mass manufacturer will have an applications engineer for every 16 salesmen. For a flexible manufacturer, the ratio is one to one (Honeycutt:2). Flexible manufacturers spend more on training, 5% of annual payroll versus 1% for the manufacturing average (Zammuto:720). In addition, flexible manufacturers invest in more R&D than the average manufacturer (Zammuto:720). Thus, a flexible manufacturer could not recoup many overhead costs.

Another deterrent of CAS is its incompatibility with the flexible manufacturer's pricing scheme. The flexible manufacturer gains some increased profitability because he can demand a premium price for a custom product. Because he's making a custom product, he does not have a market price upon which to base his price (Honeycutt:3). A flexible manufacturer would see little benefit from bidding on a DoD contract that includes cost-based pricing. Thus, without a revision to the DoD cost accounting requirements, bidding on a DoD contract for a customized product is not attractive to a flexible manufacturer.

A second obstacle is current restrictions on supplier relationships. The flexible manufacturer couldn't continue to do business if he had to abandon his long-term relationships with his suppliers. As Engineering-Business professor, Michael Borrus points out, the flexible manufacturer achieves high quality and low cycle time because he draws his suppliers into his integrated team (68). Business professor, Earl Honeycutt, points out that interfirm cooperation between the flexible manufacturer and his suppliers is essential to his operation (2). A flexible manufacturer could not alter business practices so essential to his success in the commercial market place to take on a DoD contract.

Third, the flexible manufacturer treasures his technical expertise and uses it to fill niche markets. He cannot accept government acquisition of technical data rights and release of that data to a competitor. Therefore, DoD's insistence on acquiring data rights would deter a flexible manufacturer from bidding on a defense contract.

Finally, DoD would have to drop military specifications that detail the production technique and quality assurance procedures. The flexible manufacturer achieves economy of scope, using the same process to produce a variety of products. He will not have the capital nor will he have the desire to invest in specialized equipment and procedures. If DoD wants to take advantage of the benefits of flexible manufacturing, it will have to agree to commercial fabrication methods.

Thus, if the DoD tries to let market forces drive the switch to flexible manufacturing, it will recoup p only a few of flexible manufacturing's benefits. This approach avoids political obstacles to reform and does not sacrifice operational capability. However, the price is high in losses of the benefits of flexible manufacturing.

As an alternative, DoD could take an aggressive stance toward acquisition reform, focusing on reforms that enhance the benefits of flexible manufacturing. This strategy would include the following elements:

1) DoD must recognize the need for unique defense systems such as nuclear submarines, nuclear weapons, and stealth technology. However, these systems can still benefit from flexible manufacturing in the sub-tiers. DoD designs would strive to use commercial parts and commercial standards. Where this is not possible, specifications would be functional only and should not include detailed production specifications. This will make it possible for prime contractors to attract flexible manufacturers to bid and produce subcomponents. To promote this approach, DoD could use "commercial standards" advocates similar to today's competition advocates.

2) Second, DoD should change the application of the cost accounting standards (CAS) to contracts for components which lend themselves to flexible manufacturing. Flexible manufacturers could apply rules similar to those for non-developmental items. They would not determine price based on cost, but set price based on comparable custom-made items from the same production line. In this way, flexible manufacturers would recoup an "equivalent" price from DoD.

3) Third, DoD must review restrictions on supplier relationships and retention of data rights. Flexible manufacturing holds the most promise at the component level. This is where similarities between civilian and military requirements exists. Therefore, DoD should minimize restrictions at the subtier level. DoD should acquire technical data sparingly. With commercial parts and standards, DoD could take advantage of competition in the commercial market to get multiple sources.

These recommendations define a strategy that maximizes the benefits of flexible manufacturing. Therefore, it provides enticements to flexible manufacturers to produce defense products. It overcomes the obstacles listed in Table 2. It does so by focusing reform on those aspects of defense acquisition that are most incompatible with flexible manufacturing. Thus, this approach gives DoD the opportunity to benefit from flexible manufacturing.

However, there are also disadvantages to this approach. In particular, this approach will make it more difficult for the DoD to uphold its responsibility for protecting the public right to free and open competition. Anser's Dean Rhoades points out that the government restricts the use of commercial procurement practices and supplier relationships to ensure that subtier firms have a fair chance to compete for federal funds (DSMC:A-2). Further, the DOD uses strict specifications to fend off protests of citizens who don't win DoD contracts (A-6). Thus, this approach could increase protests and unfairly limit opportunities for all to compete for federal contracts.

The proposed changes also effect DoD's approach to ensuring the government gets a "fair price". Since DoD is the only customer for the systems it buys, the defense cost accounting system determines a fair price since no market price exists. Instead, the DoD would seek to get a fair price based on "comparable" market items. The challenge lies in defining comparable items. Similarly, the government requires technical data rights so it can "create" competition (DSMC: A-8). If DoD attempts to eliminate these practices, it will have to use another method for protecting against excess profit taking. The proposal relies on competition in the commercial market.

Another disadvantage is that these reforms will require Congressional participation. Because these changes may shift defense purchases amongst Congressional districts, representatives will resist to protect constituency jobs. Consensus building will be difficult and compromises may dilute the reforms. Thus, although this approach could provide the maximum benefits, it has disadvantages.

Recommended Approach

Despite the challenges posed, I believe that the DoD should adopt the second alternative. I believe this approach presents a reasonable compromise between increasing flexible manufacturing and meeting unique defense acquisition requirements. The first alternative is "safer and easier". But, it also has a lesser pay-off. With a steeply declining procurement budget, DoD can't afford the conservative approach. The challenges posed to alternative two are not insurmountable and there is room for compromise. In addition, it is consistent with changes to defense acquisition recommended by Congress's Office of Technology Assessment, President Clinton's Defense Conversion Commission, and the Defense Science Board (US Congress:ii; Defense Conversion:iv; DSB:i). Therefore, the foundation for political support is in place and the time is ripe for DoD to change.

Summary and Conclusion

In summary, in the 1990s, DoD must maintain a defense industrial base with declining budgets. The future defense industrial base must develop, produce and support military systems in peacetime as well as provide surge and mobilization capability. Flexible manufacturing provides a partial solution to meeting these requirements. Flexible manufacturing systems will enable commercial manufacturers to fabricate military parts and to design, develop, and produce future defense products. DoD could try to benefit from flexible manufacturing by allowing the market forces to drive manufacturers to become more flexible. However, DoD has much to gain if it takes a more aggressive approach. It must revise cost accounting standards, curtail military specifications and standards, reduce requirements for technical data rights, and ease restrictions on commercial procurement practices. These changes must satisfy the need to better integrate commercial and defense industries while protecting the public right to open competition. To make these changes, DoD will have to achieve political consensus. That will be difficult. However, I believe the changes are necessary to provide the US armed forces with the systems they need to meet the challenges of the 1990s and beyond.

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APPENDIX C

THE DUBIOUS FUTURE OF DUAL USE

by Paul McIlvaine

INTRODUCTION:

"A restructured Defense Department will focus ... on creating a streamlined, efficient acquisition process ..., working to integrate more closely defense and commercial technology and manufacturing." [1] These words were promulgated by President Clinton shortly after he assumed office. He further elaborated, in stating that "In the Department of Defense, we will propose additional funding for dual-use technology programs ..." [2] Vice President Gore's National Performance Review has specifically stated an objective of " ... systematic reform of the procurement process ..." [3] "We will ask the Office of Management and Budget to draft a new federal commercial code with commercial-style procedures, and then ask Congress to adopt the new code and remove impediments to this money-saving approach to procurement. The government can save enormous amounts of money by buying more commercial products instead of requiring products to be designed to government-unique specifications."[4] Secretary of Defense Dr. Bill Perry points to the urgent need to acquire equipment, systems, and services much more economically than in the past.[5]

The intentions of the Executive Branch of Government are clear and constitute a major change in the way in which we currently acquire defense systems. The hard part will be the implementation of these intentions.

WHAT IS DUAL-USE ?

Dual Use implies products or families of products that have both commercial application and military application.

- Commercial Off the Shelf (COTS) - Identical Item used for both commercial and military application, produced on the same production line.
- Modified COTS used for military application and produced on the same production line as the commercial item.
- Different end items for military and commercial applications that use the same pieceparts, modules and/or subsystem components, ideally produced on the same production line.

The essence of the definition is that all or part of a military system (including hardware, software, people, facilities, data, etc.) can be researched, developed, produced, and/or operated & maintained in common with a commercial system.

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[1] Clinton, William, A Vision of Change for America, US Government Printing Office, 17 February 1993, p.70.

[2] Ibid, p.51.

[3] Gore, Al, Report of the National Performance Review: Creating a Government that Works Better and Costs Less, The White House, 7 September 1993, p. iv

[4] Ibid, p.30.

[5] Deutch, John; Acquisition Reform and Dual-Use Technology; Army RD&A Bulletin, Nov-Dec '93, p. 49.

The seductive appeal of dual-use technology has resurfaced as defense contractors face a dropoff in weapons orders ... if they can develop dual-use product lines, these companies can more readily shift between defense and commercial work, thereby avoiding massive layoffs or even bankruptcy.[6]

The dual-use nirvana involves weapon and component designs that incorporate commercial products & processes; military & civilian products manufactured side by side; and private firms heavily involved in providing depot level maintenance and upgrades for deployed forces. All of these efforts will be done to commercial specifications & standards, using commercial procurement and financial procedures. DoD in-house R&D efforts can focus on military unique technologies (that can only be built with unique processes), while assimilating new civilian R&D to meet defense needs. [7]

CURRENT EXTENT OF DUAL USE

Dual Use is currently the exception rather than the rule. The reasons are numerous:

- There is no uniform definition for commercial items; instead, a number of conflicting definitions have been implemented in regulation.[8]

- The Byzantine complexity of current Laws on defense acquisition have impeded civil-military integration and forced firms to isolate their defense work from their civilian work.[9] The DoD Acquisition Law Advisory Panel examined all of the over 600 DoD related procurement laws and recommended amendment, deletion, or repeal of just under 300.[10]

- Defense procurement has been managed to death and subjected to extreme oversight in order to pursue accountability. More than 400 government personnel are located in a military jet engine plant to monitor production; at the same plant (where some of the finest commercial jet engines are manufactured), the commercial customers do not have a single full-time quality inspector.[11]

- Defense Dollars are required to perform dual-use - provide for the common defense and promote the general welfare (protecting the environment, supporting small/disadvantaged business, rehabilitating prisoners, providing employment for the handicapped[12], etc.), thus rendering them relatively inefficient. Commercial dollars are only required to perform a single-use - to be spent efficiently.

- Not all Military products (such as nuclear submarines, tanks, sonobuoys) and technologies (such as nuclear weapons, stealth aircraft) have a commercial application. Thus, dual use has limited applicability.

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[6]Evans, David; Dual-use technology could prove to be a troubled marriage; January 15, 1993, The Chicago Tribune, p. 19.

[7]U.S. Congress, Office of Technology Assessment, Building Future Security, OTA-ISC-530 (Washington, DC: U.S. Government Printing Office, June 1992), p.23.

[8]Streamlining Defense Acquisition Laws, Executive Summary: Report of the DoD Acquisition Law Advisory Panel, March 1993, Defense Systems Management College Press, p. 10.

[9] Ibid, p.7.

[10]Paige, Emmett; Re-Engineering DoD's Operations; Defense 93, Issue 6, p. 20.

[11]Adleman & Augustine, The Defense Revolution, 1990, San Francisco, California, ICS Press, p. 170&177.

[12]Fox, J. Ronald; The Defense Management Challenge, 1988, Boston, Massachusetts, Harvard Business School Press, p. 39&40.

• Military acquisition regulations, buying rules, and accounting practices require special certifications, record keeping, and socio-economic requirements that are completely alien to commercial practice. In 1988, the House Committee on Armed Services listed 33 different "social and economic programs" that generate requirements affecting military procurement - none is related to enhancing national security - each represents another burden placed on the military acquisition system to achieve nonmilitary objectives.[13] While each of the rules, laws, regulations, and policies had a laudable purpose for its adoption, they often add no value to the product itself, and when combined, contribute to an overloaded system that is often paralyzed and ineffectual, and at best cumbersome and complex.[14]

• Military Specifications & Standards, imposed on a commercial computer chip, according to a senior DoD official, increases cost (over comparable commercial items) by 10 times and imposes a time delay of 1-2 generations in technology.

• Commercial buyers seek out suppliers of high-quality, low-priced products; establish "preferred customer" (lower) prices, and then stay with them as long as the relationship remains mutually beneficial ... defense acquisition buyers cannot establish and maintain long-term supplier relationships while simultaneously balancing requirements for competition.[15]

• The Military Performance tradeoff mindset is incompatible with commercial practices, resulting in few success stories. The military acquisition system rewards those who follow the rules, document their actions, and avoid risk - rather than innovate and use good business judgement.[16] As a result, contractor relationships with the government are totally different now from the relationships that exist between these same contractors and their commercial customers.[17]

• It takes 14 years, on average, to go from the beginning of the Concept Formulation stage to Operational Deployment of Military Systems.[18] Commercial systems can proceed from design through development and marketing to obsolescence in less than 5 years - particularly consumer items or high tech items.[19] This is not uniform throughout commercial industry: Japanese automakers introduce a new line of products every 7 years, while Americans wait as long as 15 years to turn over a basic product line.[20]

• Military Systems have service lives far in excess of commercial systems. An example is the Lockheed Electra Airframe - a 1950's commercial airliner - and its military derivative P-3 Orion Aircraft. No major U.S. Airline is still using this turboprop aircraft, yet the US Navy will continue to use this airframe into the next century.

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[13]Weidenbaum, Murray; Small Wars, Big Defense; 1992, New York, Oxford University Press, p. 161.

[14]Department of Defense Monograph; Acquisition Reform - A Mandate for Change; February 9, 1994, p. 5&6.

[15]Commercial Practices for Defense Acquisition Guidebook, Defense Systems Management College, Fort Belvoir, Virginia, January 1992, p. 4-1&4-2.

[16]Department of Defense Monograph; Acquisition Reform - A Mandate for Change; February 9, 1994, p. 7.

[17]Adleman & Augustine, The Defense Revolution, 1990, San Francisco, California, ICS Press, p. 151.

[18]Ibid, p. 178.

[19]Alic, John [et al]. Beyond Spinoff, 1992, Boston, Mass., Harvard Business School Press, p. 146.

[20]Carnevale, A.P.· America and the New economy; 1991, U.S. Department of Labor, p. 33.

• In the commercial world, a buyer unilaterally excludes a supplier of shoddy or unacceptable merchandise from future business. Once a buy decision is made in the commercial sector, it is usually uncontestable by the losing offerers.[21] Defense buyers cannot exclude suppliers with the same degree of ease - DoD requires objective reasoning that would sustain a protest to even consider suspension of any suppliers.

• A senior DoD official recently estimated that one-third of the overhead costs of defense firms are attributable to the cost of procedures and administration of the security system necessary for defense work.

• The procurement process is a political one in which DoD is subject to intense regulation and scrutiny, and is often directed to act in a way that is at odds with good commercial sense.[22]

Perhaps the most vivid example of the current difficulties of dual-use was cited in the report of the DoD Acquisition Law Advisory Panel. During the Gulf War, the U.S. Army placed an emergency order for 6000 commercial radio receivers, waiving all military requirements and specifications because of the urgency of the situation. However, no responsible procurement official could be found who would waive the requirement for the company to certify (under pain of a felony charge) that the Army was being offered the lowest available price. Because of the wide marketing of the commercial radio through independent distributorships, no radio company official was able to knowingly make such a certification. The impasse was only resolved when the Japanese government bought the radios without a price certification, donated the radios to the U.S. Army, and credited the purchase against Japan's financial contribution to Operation Desert Storm.[23]

POTENTIAL BENEFITS OF DUAL USE

• Lower Cost: Dual use items cost considerably less than military only items due to greater competition and higher-volume commercial production efficiencies. Commercial business is also not subject to the socio-economic burdens imposed on Defense.

• Increased Capacity & Responsiveness: The Industrial Base devoted exclusively to Defense is slowly, clearly, and progressively deteriorating, as Market Forces take their toll. A dual-use Industrial Base will be stronger and more responsive (in time of war) to surge demands.

• Schedule: Commercial items transition from initial idea to fielded system in less time than military items. Dual-use items should achieve this same result in less time than it currently takes for an exclusively military item.

• Potential for Innovation: Military business no longer drives technology as in the past - defense relevant technologies are increasingly developed in the civil sector and by other countries. Dual-use will prove a better method of incorporating commercial technology into defense items (AKA - "spinon").

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[21]Commercial Practices for Defense Acquisition Guidebook, Defense Systems Management College, Fort Belvoir, Virginia, January 1992, p. 3-2.

[22]Kapstein, Ethan; The Political Economy of National Security; 1992; New York, McGraw-Hill, Inc., p. 128.

[23]Streamlining Defense Acquisition Laws, Executive Summary: Report of the DoD Acquisition Law Advisory Panel, March 1993, Defense Systems Management College Press, p. 3&4.

• Stability: Plant and labor should be more stable in a facility with both defense and commercial business vice either one alone.

• Warranties: Commercial firms generally stick by their products, since their future business depends on customer satisfaction. Warranties are standard commercial practice, and well-understood.

• U.S. Competitiveness: Dual-use should strengthen U.S. Competitiveness in the World Economy by increasing our economies of scale. A dual-use industrial base is stronger, since it is maintained by both the DoD and the national economy as a whole.

POTENTIAL DRAWBACKS OF DUAL USE

• Performance: Under dual-use, a military requirement can no longer drive all aspects of the design, which will not be optimized solely for the military application. Tradeoffs between the military and commercial application will have to be made.

• Cost: Commercial items tend to be optimized to keep initial purchase price low - even at the expense of higher life cycle costs. Military items tend to be optimized to keep life cycle costs low - even at the expense of higher initial purchase price.

• Incompatible Service Life: Commercial service lives tend to be shorter - while military service lives may be two or three times as long. This will result in costs and problems if a manufacturer wishes to cease production of technologically obsolescent (but still useful) end items or spare parts, or upgrade the commercial item (that the military may not be interested in).

• Increased Vulnerability: Dual-use eliminates the distinction between civilian and military targets, since the same target (Production Plant, Logistics Depot, R&D Laboratory, etc.) performs both Civilian and Military functions. Enemy destruction of a single (dual-use) target eliminates both military and civilian potential. Hence, our national vulnerability is greater under a highly successful dual-use program vis-a-vis separate military and civilian facilities.

• Political Cost: The political cost and acceptability of destroying enemy dual-use facilities (example - a "baby milk factory" that also processes & packages Military Rations) may be significant.

EXAMPLE OF DUAL USE

The Beretta 92 Family of pistols is a highly successful example of dual-use. The adoption of the Beretta 92F as the standard Military 9mm handgun resulted in this Italian firm enlarging its production facility in Accokeek, Maryland (employing local residents) to produce both military and civilian versions of the pistol on the same production line. In addition to production efficiencies, design (the military design was based on an earlier civilian design called model 92) and logistics efficiencies (identical ammunition, parts, and manuals can be used in both civilian & military versions) were achieved. Prices are as follows:

Military Beretta 92F pistol	approximately $ 200 each
Police Force Beretta 92F pistol	approximately $ 400 each
Civilian Beretta 92F pistol	approximately $ 630 each[24]

Today, the Beretta 92 is in wide use throughout the world, is carried by many police officers across America, and is a first rate handgun.[25]

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[24] 1993 Annual Catalog, Guns & Ammo, p. 209.

[25] Johnston, Gary, Beretta Model 92G, The Complete Book of Handguns, 1991, Harris Publications Inc., p. 41-43.

CONCLUSION

The Office of Technology Assessment (OTA) analysis has concluded that choosing dual-use technologies, private ownership, and competitive acquisition is preferable to alternate paths.[26] When coupled with the clear goals of the President and Vice-President, dual-use is a major acquisition innovation of the future. But the rules of the game in the defense business differ markedly from those in the commercial marketplace.[27] The Achilles heel of dual-use, however, is the necessity for defense to adopt commercial practices - which do not include such things as "Congressional pork" and the promotion of purely socio-economic objectives. The United States Congress thus continues to call for greater efficiency in DoD Acquisition (Why can't you do it like Industry does?) while legislating inefficiencies through laws that mandate that every defense dollar do double duty: provide for the common defense and promote the general welfare. Congress is not the answer to waste, Congress is the problem - the efficiencies and advantages of dual-use will only come when the Congress changes its "way of doing business," from dwelling on small details to looking at the big picture.[28]

HOW TO MAKE IT WORK

There are no technical impediments to dual-use - the real barriers are legislative, regulatory, and mindset. Dual-use requires a dramatic transformation of the defense industry and the defense "way of doing business". In other words, a major "cultural shift". Commercial companies have shaped their procedures, processes, vendor base, and personnel policies to survive the rough and tumble of the competitive global marketplace. To change these practices solely for the sake of doing government defer business would jeopardize their existing business and competitiveness.[29] Hence, it is not enough to improve the existing system - DoD must move to a carefully planned, fundamental re-engineering of each segment of the acquisition system.[30]

• The primary goals of the defense acquisition process are to ensure standardized treatment of contractors; to prevent fraud, waste, and abuse; to ensure that the government acquisition process is fair; to check the government's authority and its demands on suppliers; and to further socioeconomic objectives.[31] The primary goal of the commercial acquisition process is efficiency. These defense and commercial goals as they now stand are incompatible. Hence, a necessary prerequisite is to establish a clear set of common, unambiguous, workable dual-use goals that all players (including the Congress) agree to.

• Government Officials must be authorized to suspend application of socioeconomic laws, trade restrictions, executive orders, implementing regulations, and special certification/record-keeping requirements that require a commercial company to fundamentally alter the way it conducts business if it desires to sell to DoD.[32] These would be replaced with the Uniform Commercial Code and Generally Accepted Accounting Procedures. The Office of

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[26]U.S. Congress, Office of Technology Assessment, Building Future Security, OTA-ISC-530 (Washington, DC: U.S. Government Printing Office, June 1992), p.9.

[27]Fox, J. Ronald; The Defense Management Challenge, 1988, Boston, Massachusetts, Harvard Business School Press, p. 16.

[28]Gansler, Jaques; Affording Defense; 1989, Cambridge, Massachusetts, The MIT Press, p. 109.

[29]Integrated Dual-Use Commercial Companies: Discussion Paper - Acquisition Reform, undated.

[30]Aspin, Les; Annual Report to the President and the Congress, January 1994, p. 105.

[31]Ibid, p. 104.

[32]Streamlining Defense Acquisition Laws - Executive Summary: Report of the DoD Acquisition Law Advisory Panel, March 1993, DSMC Press, p. 10-11.

Technology Assessment reports that the entire DoD regulatory regime adds 10 to 50 percent to the cost of doing business with the government, an amount equal to tens of billions of dollars annually.[33] On average, the American Public believes almost half of the defense budget is lost to waste and fraud.[34]

• The Congress must implement the specific initiatives proposed by the DoD Advisory Panel on Streamlining and Codifying Acquisition Law (the "Section 800" Panel) to eliminate numerous statutory requirements (such as the Truth in Negotiations Act) that prevent DoD from acting more like a commercial buyer and achieving greater harmony with commercial practices and standards.[35]

• Colleges and Universities must make significant changes in basic engineering education at the undergraduate, graduate, and continuing education levels. Rather than the current fashion to train people for participation in radical technological breakthrough, future people must be trained for the incremental improvement that constitutes the bulk of commercial innovative activity - this will turn around the erosion in engineering departments by exposing students to design, manufacturing, and product support (vice upstream activities removed from commercial production and product support).[36]

• The climate in which design choices are made differs greatly between defense and commercial sectors ... the "know how" acquired in military projects is a poor guide for making design choices in commercial projects.[37] Hence, Government Acquisition Personnel and Users must be educated to change mindset and discard any dual-use aversions by seeking harmonization (satisfycing) of commercial & military requirements (AKA - more modest performance) in return for lower costs. The lack of cost consciousness in the designing of weapons (and, correspondingly, in the requirements process)[38] must become extinct.

• Demands for cost and pricing data (that has encouraged companies to maintain separate facilities and accounting systems for commercial and military production[39]) must be made commensurate with other commercial customer requests. Many companies prefer to forgo government sales rather than disclose the required information or deal with the paperwork. According to the Semiconductor Industry Association, 5 of the 10 top U.S. Semiconductor companies will not accept DoD business if the contract requires certified cost or pricing data.[40] The Acquisition Community needs to concentrate on obtaining best value vice concentrating on regulating contractor costs and prices.

• Annual purchases of high volume consumer goods can run into millions of items, while military purchases are done in relatively small lots. Hence, an incentive for Industry to participate, such as assurance of a stable, long term business relationship, may be necessary in some cases. Defense must also reorient itself to the procurement of economical lot sizes.

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[33]U.S. Congress, Office of Technology Assessment, Holding the Edge: Maintaining the Defense Technology Base, 1989, p. 9-10, 13-14, 172-177.

[34]Fox, J. Ronald; The Defense Management Challenge, 1988, Boston, Massachusetts, Harvard Business School Press, p. 36.

[35]Streamlining Defense Acquisition Laws - Executive Summary: Report of the DoD Acquisition Law Advisory Panel, March 1993, DSMC Press, p. 9.

[36]Alic, John [et al]. Beyond Spinoff, 1992, Boston, Mass., Harvard Business School Press, p. 120-121.

[37]Ibid, p. 112.

[38]Gansler, Jaques; Affording Defense; 1989, Cambridge, Massachusetts, The MIT Press, p. 198.

[39]Streamlining Defense Acquisition Laws - Executive Summary: Report of the DoD Acquisition Law Advisory Panel, March 1993, DSMC Press, p. 9.

[40]Alic, John [et al]. Beyond Spinoff, 1992, Boston, Mass., Harvard Business School Press, p. 149.

• Congressional reform and defense budget discipline must be undertaken. Instability in defense programs, resulting from the annual appropriations process and the ability of the Congress to vote on the average defense R&D program an average of 144 times (AKA - opportunities to change something) , constitutes the mother lode of waste in defense programs and must be eliminated.[41]

• Defense must wholeheartedly embrace the everyday commercial business practice of tying the opportunity to conduct future business with how well the contractor performs on its existing contracts.[42] Equal access to all must be changed to equal access for all responsible bidders who deliver as promised.

• The DoD practice of seeking continual competition for all products must be changed to the more contemporary commercial practice of settling on one supplier and building a long term relationship. This will promote better teamwork, freer exchange of ideas, building of loyalties & pride, and candid addressing of problems & concerns.[43]

• Technical data rights and intellectual property rights are another area that must change if dual-use is to succeed. Customarily, the government attempts to obtain unlimited data rights in order to preserve the option to recompete items downstream. As can be expected, this practice increases the reluctance of DoD contractors to invest in continuous improvement of a product that may be procured from another source next year.

• A uniform definition of commercial items must be promulgated and used uniformly throughout the Department of Defense. The 324 word proposed definition in the report of the DoD Acquisition Law Advisory Panel (Section 800 Panel) is the logical starting point.

• When technical difficulties are encountered in Military programs, schedule delays are used to offset the unavailability of additional short term money - thus increasing costs in the long term. In the commercial world, short term money is used to offset technical difficulties, maintain schedule, and save larger sums of money in the long term.[44] Under dual-use, these approaches must be harmonized.

• We must move away from the truly trivial, parochial, and intrusive Congressional activities that masquerade as legitimate oversight functions.[45] It has been almost impossible for members of Congress to resist efforts to get some piece of a contract for local constituents through intimate involvement in every programmatic detail of procurement.[46] Congressionally mandated laws/regulations/oversight/micromanagement must be reformed. Dual-use items cannot be subjected to the "pork" and socioeconomic considerations imposed by the Congress on the defense budget, or dual-use simply won't deliver its benefits. Congress must lay down the general principles and rules which shall govern, leaving to others the administrative details.[47]

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[41] Adelman & Augustine, The Defense Revolution, 1990, San Francisco, California, ICS Press, p. 171&178.
[42] Ibid, p. 194.
[43] Ibid, p. 190&191.
[44] Ibid, p. 187.
[45] Gansler, Jaques; Affording Defense; 1989, Cambridge, Massachusetts, The MIT Press, p. 111.
[46] Kapstein, Ethan; The Political Economy of National Security; 1992; New York, McGraw-Hill, Inc., p. 124&125.
[47] Fox, J. Ronald; The Defense Management Challenge, 1988, Boston, Massachusetts, Harvard Business School Press, p. 98.

THE LIKELY SCENARIO

In late 1993, the United States Congress balked at the Clinton Acquisition Reform package.[48] According to a senior government official, this package included those modest reforms that were thought to be easiest and most obvious to implement. Hence, the Pentagon's much-anticipated acquisition process reform plan will not be delivered to Congress until at least 1994.[49] According to Steven Kelmar, head of the Administration's Office of Federal Procurement Policy, he is cautiously optimistic that we will get a Federal Acquisition Streamlining bill sometime by Boston Spring - that is to say, June (1994).[50] Senate Bill S1587 (The Federal Acquisition Streamlining Act of 1993) appears to offer the most promise for reform. Implementation of the legislation would then follow passage and enactment. Note, however, that the last major rewrite of the basic DoD procurement directives (DoD directive 5000.1 series) took over two years. Hence, dual use reform under this scenario can be expected to take one complete four year Presidential Administration to prepare to implement. In reality, it may take 1-3 years to implement new laws and regulations, and even longer to foster the perspective and skills needed to implement new regulations effectively.[51]

Based on this seeming inability of the government to come to grips with the dual-use issue in a timely fashion, the most likely scenario for implementing dual-use in the short run appears to be as follows:

- The players in the defense acquisition process will not reach consensus on clear, unambiguous goals for dual-use acquisition. In the absence of consensus, the direction will be to simultaneously achieve incompatible goals of accountability, fairness, and efficiency.

- Every reform and simplification in defense procurement will have an opponent; as a result, compromises will be struck and true acquisition reform will be "watered down". Nearly 900 different Procurement Laws and more than 4,500 pages of regulations will continue to hamper efforts of the Acquisition Workforce. The "Section 800" Panel reforms will be very slowly addressed if at all.

- Hampered by Congressional inaction, only modest revision to the approximately 1000 pages in the current DoD 5000.1 series of Acquisition Regulations will be undertaken and require at least two years to promulgate (note that over one year has already passed). Strong words exhorting the desirability of dual-use will appear in the introductory pages of the revised DoD directive 5000.1; however, the body of the document will be largely business as usual. This will significantly impede practical implementation of dual-use in the massive DoD downsizing.

- The DoD leadership will address the problem of education and training by tasking the Defense Systems Management College (or a Defense Acquisition University equivalent) to quickly reinstitute the one week *Acquisition and Distribution of Commercial Products* Course (the original course was cancelled in the early 1980's after less than one year of operation due to lack of interest). The urgency of the tasking will require the course to be developed before major changes to DoD directive 5000.1 are completed/promulgated, leaving educators to "guess" on emerging major policy. In the first year of frenzied operation, 500 students will graduate from the new course. The Acquisition Workforce will then be expected to go out and do it .

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[48] LeSeur, Stephen, DoD Acquisition Reform Plan Stalls, Defense News, 25-31 October 1993, p. 1.

[49] Ibid

[50] Barr, Stephen, Trying to Add Common Sense to Procurement, The Washington Post, February 24, 1994, p. A25.

[51] Fox, J. Ronald; The Defense Management Challenge, 1988, Boston, Massachusetts, Harvard Business School Press, p. 37&38.

• Commercial Industry (capable of dual-use) will react like the 5 of the 10 top U.S. Semiconductor companies and generally not accept overregulated DoD business. The Defense Industry, however, will understandably jump at the business opportunity (to survive or avoid bankruptcy) and provide an optimistic assessment, since most of those who remain in the Defense Department are (by temperament) unfailingly optimistic.[52] To date, however, there is a discouraging history of failure in commercial diversification efforts by defense firms.[53] When actual results fall short of expectations, litigation can be expected to drag on for years.

• Subsequently, Political Appointees and the "Spin Doctors" (in a rush to show accomplishments before the 1996 elections) will declare success.

• The National Press will not find the degree of success claimed upon examination of specific cases, report on the early litigation, and editorialize on the incompetence of the Department of Defense and the moral ineptitude of Defense Industry.

• The U.S. Public, reacting to the overwhelming press reports, will renew its skepticism and lack of trust in its government and industry.

• The Congress will address the public-perception problem by another round of additional non value-added laws/regulations/oversight/micromanagement aimed at solving the public perception crisis, but failing to address the root causes of the problem . The 1600 pages of the Federal Acquisition Regulation (FAR) and the 2900 pages of agency-specific supplements will grow. The Congress, in a binge of re-election exhortations, will attempt to blame the Acquisition Workforce for the entire problem.

Hence, the most likely short-run scenario is for dual-use to fail. When this failure is generally recognized, two alternate scenarios are likely in the long-run.

The first alternative is for a variation of the whole process to repeat itself. Congress will refuse to relinquish any control over the process, incompatible goals will remain, and thus doom all efforts to failure. True progress will be impossible in a situation where the symptoms are treated, while the underlying problem is not recognized nor addressed.

The second alternative is for enlightened leadership to recognize the importance of dual-use to the future of a country with reduced defense expenditures, and to recognize that there is no other practical alternative. Because of its complexity, a major overhaul of the acquisition system cannot happen overnight.[54] This alternative will likely require the cultural shift caused by a new generation of leadership and can be expected to take on the order of 10 - 20 years. This sustained leadership effort will address the real problems and do what it takes (including the politically incorrect and unpopular things) to commence the successful implementation process for dual-use.

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[52]Fox, J. Ronald; The Defense Management Challenge, 1988, Boston, Massachusetts, Harvard Business School Press, p. 15.

[53]Adleman & Augustine, The Defense Revolution, 1990, San Francisco, California, ICS Press, p. 159

[54]Department of Defense Monograph; Acquisition Reform - A Mandate for Change; February 9, 1994, p. 12.

EPILOGUE

The next decade will not be business as usual in defense - we face the most unprecedented challenge in a generation. Politically incorrect, radical changes in defense acquisition will be necessary to cope efficiently and effectively with the challenge of the most radical downsizing of United States Armed Forces since the conclusion of World War II. The current pro-seller attitudes and socioeconomic goals of defense acquisition will have to face the hard reality of the need to achieve efficiency in executing a downsized defense budget now and into the future. A sweeping overhaul of the entire government procurement process is the only effective remedy.[55] If DoD is going to be capable of responding to the demands of the next decade, there must be a carefully planned, fundamental re-engineering or re-invention of each segment of the acquisition system.[56] New beliefs, behaviors, and patterns of interaction do not come easily, especially when the tried-and-true has the cumulative weight of history to recommend it.[57] These changes constitute innovation which, by its very nature, requires deviation.[58]

Politicians will have to be politically incorrect;
Skeptical contractors will have to be willing to try again;
Bureaucrats will have to be non-bureaucratic;
A biased press will have to become unbiased.
An untrusting public will have to become trusting;

Weapons acquisition is embedded in the American Political System and involves hundreds if not thousands of defense officials, members of Congress, and industry executives - each group pursuing its narrow interests, with little regard for overall quality and cost.[59] Until the major participants in the acquisition process reach a consensus, nothing is accomplished.[60] Or, in other words, the leaders of each one of the major players will have to reverse their previous behavior and agree on clear, common, unambiguous goals in order to make dual-use work! Can a leopard change its spots? Will our current leaders step up to the challenge? Recent history and the first Congressional reaction to acquisition reform proposals indicate no - at least in the short-run.

Perhaps Rep. J.J. "Jake" Pickle (D - Texas) has perhaps summed up the immediate future best: "Before long, these reforms will be strangled in their infancy by the very same special interests and entrenched bureaucracies that brought us this mess in the first place."[61]

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[55]Weidenbaum, Murray; Small Wars, Big Defense; 1992, New York, Oxford University Press, p. 167.

[56]Department of Defense Monograph; Acquisition Reform - A Mandate for Change; February 9, 1994, p. 8.

[57] Carnevale, Anthony; America and the New Economy; 1991; San Francisco, California; Jossey-Bass Publishers, p. 235.

[58]Alic, John [et al]. Beyond Spinoff, 1992, Boston, Mass., Harvard Business School Press, p. 3.

[59]Kapstein, Ethan; The Political Economy of National Security; 1992; New York, McGraw-Hill, Inc., p. 126.

[60]Fox, J. Ronald; The Defense Management Challenge, 1988, Boston, Massachusetts, Harvard Business School Press, p. 18.

[61]Barr, Stephen: Fast Track to Streamlined Procurement?, The Washington Post, Monday, October 25, 1993, p. A17.

APPENDIX D

Risk in the Acquisition Process

a better concept

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1 April 1994

Introduction

Acquisition management is risk management. It consists of identifying risks associated with cost, schedule, and performance then managing those risks to minimize overall program risk. In their book, *Risk Management*, the Defense Systems Management College (DSMC) develops a framework for risk management in acquisition. This excellent model defines risk as "the probability of an undesirable event occurring *and* the significance of the consequence of the occurrence (3-1)." In practical application this means the acquisition manager must use a certain amount of subjective judgment to assign probabilities and consequences. In addition, he/she must also use judgment in determining the risk resulting from the relationship between those probabilities and consequences. Several models exist to help with this latter chore but they are not consistent and tend to be somewhat imprecise. In this paper I will examine the relationship between probabilities and consequences and propose a more precise model that will reduce the reliance on subjective managerial judgment when assessing risk.

Background

In my experience as an Air Force flyer I became familiar with the flying safety community's concept of risk as shown in figure 1. This concept shows that an event with a low probability of occurrence and a low consequence if it does occur, would present a low risk. On the other hand, an event with a high probability of occurrence and a

catastrophic consequence would present a high risk. The area in between represents a transition from low to high risk and we label it moderate risk.

DSMC presents two slightly different concepts of risk. These are shown in figures 2 and 3. Note in these concepts the axes are the reverse of the flying safety concept.

All the concepts agree that a risk rating system should be kept simple with low, moderate, and high designations. They also agree that the lower left quadrant generally represents low risk and the upper right quadrant generally represents high risk. They differ in how the other two quadrants are interpreted:

- *High probability, low consequence.* In the first DSMC concept (figure 2) the upper left quadrant represents low risk. In the second concept (figure 3) the upper left quadrant generally represents moderate risk. This corresponds to the lower right quadrant of the flying safety concept (figure 1) which also generally represents moderate risk.

- *Low probability, high consequence.* Interestingly, DSMC illustrates this quadrant with an example based on flying safety: flying in a commercial airliner is low risk because, although the consequences of a crash are severe, the probability is low (3-1). However, the flying safety concept would classify this condition as moderate risk (figure 1). The second DSMC concept (figure 3) represents this

quadrant as generally representing moderate risk but it also reflects the low risk nature of this example. The first DSMC concept (figure 2) represents this quadrant as "increasing risk" and describes it as "more subject to individual interpretation and requires strict program guidelines for rating the risk (3-2)."

DSMC hones the concept of risk by differentiating it from uncertainty. Risk stems from an event associated with a known probability distribution. Uncertainty stems from an event associated with an unknown probability distribution (3-1). In actual practice, especially in the acquisition world, probability distributions are never very well known. We normally apply judgment to make various assumptions to achieve acceptable approximations. Finally, in their discussion of rating schemes and definitions, DSMC concludes, "The definition issue becomes one of identifying impacts and deciding on a scale(s) and then shaping the boundaries between the three regimes (4-8)." They recognize that judgment is required for each of these endeavors. I propose that shaping the boundaries can be more objective and less reliant on judgment.

Shaping the Boundaries

The foregoing discussion showed an obvious lack of agreement on the shape of the boundaries between risk levels. In this section I offer some assertions to add more precision to the shape of the boundary curves.

• *Assertion 1: Probability is the independent variable and should be on the x axis.* Although the axis selection is somewhat arbitrary and the same results will be achieved either way, it's important to establish a convention so everyone has the same point of reference. I argue that an event must occur before a consequence results. In other words the consequence is dependent on the event occurring which is represented by probability. Figure 1 reflects this assertion.

• *Assertion 2: Probability is bounded at both ends, consequence is only bounded at the lower end.* By definition, probability can only assume values between 0 and 1 inclusively. Some events can have a 0 consequence but other events can have unmeasurably high consequences. Furthermore, consequences cannot be negative. From the DSMC definition of risk, we are only dealing with undesirable events. A negative consequence would therefore represent a desirable event and is incompatible with the concept of risk. In fact, the favorable results of a particular event become the subject of another decision after the risk is determined: the acquisition manager must weigh the risks of a particular action against the benefits.

• *Assertion 3: As probability approaches 1.0, risk becomes undefined.* Whether the consequences are grave or negligible, the event is imminent. The problem becomes one of damage control, not risk management. None of the risk concepts presented earlier adequately reflect this assertion.

• *Assertion 4: At probability 0, risk is in the low regime.* Whether the consequences are grave or negligible, the event is not possible. There is no risk associated with a non-event. Figures 2 and 3 reflect this assertion.

• *Assertion 5: The nature of risk is different on each side of the point where probability is 0.5.* This assertion reflects an intuitive sense about risk. You tend to manage things differently if the odds are against you than if the odds are with you. Figure 2 reflects this assertion by separating quadrants at the point where $x = .5$.

What sort of graphical concept reflects all of these assertions? I offer the concept shown in figure 4. Assertion 1 is obviously incorporated. Assertion 2 is satisfied by the asymptotic nature of the curves as x approaches 0. There is a finite difference between risk levels at any conceivable consequence level. Assertion 3 is satisfied by the curves converging at the point where probability is 1. At that point, risk is neither low, moderate, nor high; it is simply undefined. The curves converge rather steeply to that point to reflect the fact that, even though imminent, an event with very little consequence is certainly not a high risk and hardly a moderate risk. Assertion 4 is satisfied by the asymptotic nature of the curves as they approach $x = 0$. A highly unlikely event is low risk even if the consequences are catastrophic; recall the example of flying on a commercial airliner. Assertion 5 is satisfied by the inflection point at $x = .5$. When $x < .5$ the slopes of the curves are increasing, similar to the curves in Figure 3. When $x > .5$

however, the slopes are decreasing. Although the change is very gradual, the nature of risk *is* different on either side of the break-even odds.

If you are familiar with statistics you may recognize these curves as Gaussian, or bell-shaped, curves that have been rotated sideways. Gaussian relationships tend to occur throughout nature from nuclear physics to biology to cosmology. I cannot rigorously prove that they also apply to boundaries between risk levels but it is certainly intuitively appealing to use them. The appendix contains more detail on the actual mathematical expressions. Selecting coefficients to vertically position the curves belongs in the same decision arena as determining the scale for the y axis and no doubt requires judgment. For this presentation I selected coefficient values so that the tangents to the points where $x = .5$ have slopes of $-3.33/1$ and $-6.67/1$ for the lower and upper curves respectively. Other than making this decision on scale, no other judgment is required to determine the actual shape of the risk boundary curves.

Conclusion

The concept of risk is fundamental to the acquisition system. A concrete risk concept would minimize error propagation throughout the entire risk management process. Unfortunately the process of assessing risk is non rigorous, subjective, and relies heavily on judgment. The concept presented in this paper adds some measure of

objectivity to the risk assessment process by defining the shape of the curves separating the risk regimes. The risk assessment process is still very imprecise and a great deal of judgment is required to assign probability and consequence values to a range of possible events. With this concept of risk however, less judgment is required when examining the combination of the two.

Figures

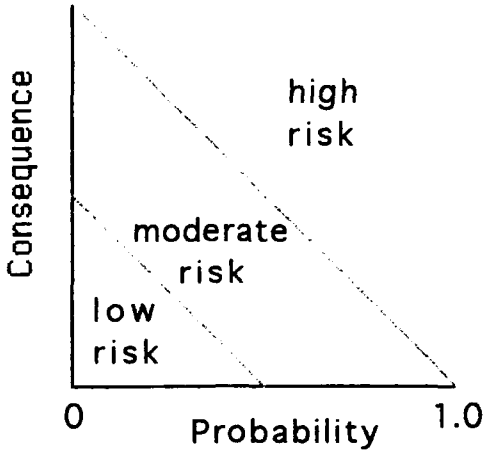

Figure 1: Flying safety concept of risk (AFFTC 19)

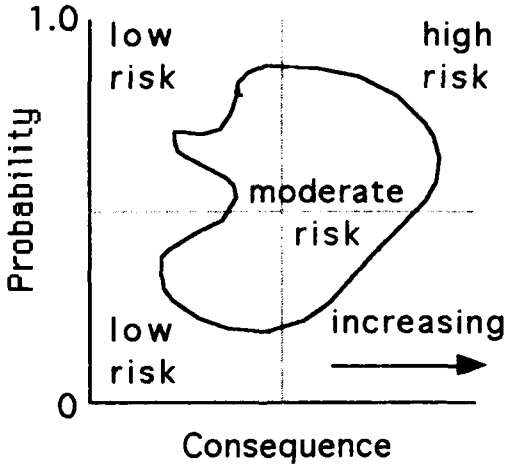

Figure 2: DSMC concept of risk (3-2)

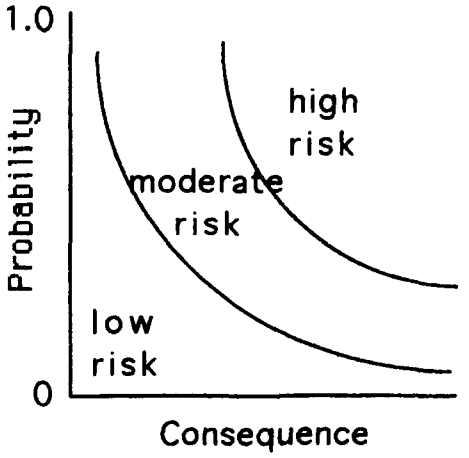

Figure 3: DSMC risk rating (4-9)

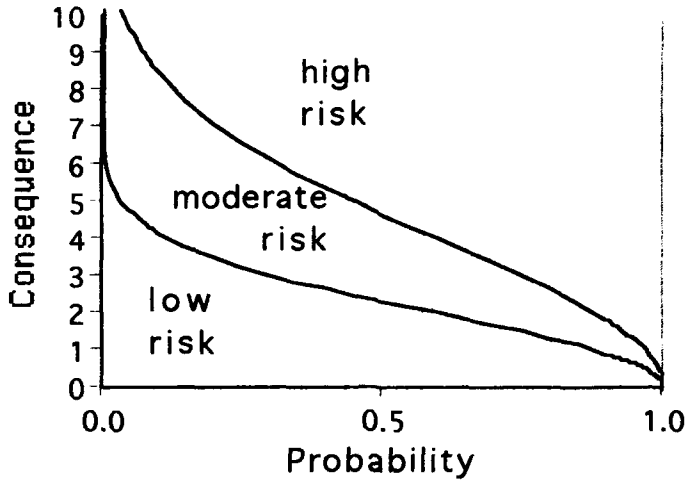

Figure 4: A better risk concept

Appendix: the Gaussian function

The familiar bell shaped curve is expressed by the Gaussian function:

$$Y = ae^{-bX^2}$$

To represent the curves shown in figure 4 we need to rotate the curves 90 degrees clockwise. To do so we make the following substitutions:

$$X = y$$

$$Y = -x$$

so the equation becomes:

$$-x = ae^{-by^2}$$

algebraically rearranging produces:

$$y = \sqrt{-1/b \ \ln(-1/a\, x)}$$

The constant, $-1/a$, determines the x-intercept of the curve. To comply with assertions 2 and 3 we want the curves to intercept the x axis at $x = 1$. Furthermore, the argument of the natural log must be greater than 0. Therefore we choose $a = -1$. Let us also define another constant:

$$k = \sqrt{1/b}$$

This constant determines the slope of the curve at any given value of x which also determines the vertical spread of the curve.

So the final expression for our curves is:

$$y = k\sqrt{-\ln x}$$

As mentioned above, we are also interested in the slopes of the curves, specifically at $x = .5$. We know that the slope, m, is equal to the first derivative of the equation for y:

$$m = dy/dx$$
$$= 1/2\ k\ (-\ln x)^{-1/2}\ (-1/x)$$

Setting $x = .5$ and solving for k in terms of m, we arrive at:

$$k = -.833\ m$$

In this model I arbitrarily selected slopes for the upper and lower curves to be -6.67 and -3.33 respectively. This results in values for k being 5.55 and 2.77 respectively.

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APPENDIX E

PROGRAM INSTABILITY: RUNNING THE PPBS GAUNTLET

By COL Roger L. Duckworth

Seminar 2

INDUSTRIAL COLLEGE OF THE ARMED FORCES
FORT LESLIE MCNAIR, WASHINGTON, D.C.

PROGRAM INSTABILITY: RUNNING THE PPBS GAUNTLET

COL ROGER L. DUCKWORTH

INTRODUCTION

The Planning, Programming, and Budgeting System (PPBS) was initiated in 1961 to order the process of formulating national goals and objectives into a defense budget. The system is analogous to the typical manufacturing assembly line of that period. Ideas started at one end and proceeded orderly down the line, from design, to manufacture, to inspection and ship or reject. Rarely did a design engineer talk to a manufacturing engineer. Inspectors talked to no one--being content to pass judgement by their exacting standards. Likewise, the PPBS system evolves from planners to programers to budgeteers. At each level assembly is done by dedicated experts. Rarely does one assembler venture into a "lower" assembler's area. Comptrollers inspect the final product and, often, rework the product with little regard to the original design. The PPBS system, like the assembly lines of the 1960's, does not function at the World Class level. In this paper I will describe the PPBS system, its effects on program stability, and offer suggestions for building a quality system.

WHAT IS WRONG?

A Program Manager expects to guide his program through a system where his mistakes or his contractor mistakes can lead to program instability or cancellation. What the PM does not expect is to have his healthy program hamstrung by multiple changes made possible by the machinations of PPBS--the system designed to solidify the planning, programming, and budgeting cycle. To continue the factory analogy, in PPBS the planners get together and design a luxury car. They then hand the drawings to the programers who proceed to build a family sedan. At the end of the line budgeteers inspect the sedan--then take torches and turn the sedan into a truck. In hindsight, a van was needed. At each stage of the process, each piece of the vehicle (program) can undergo major changes with little regard for the short and long term effects. These multiple change opportunities are a structural part of PPBS.

WHAT IS PPBS?

The focus of the paper is the PPBS effects on program (in)stability. I will provide a cursory description of PPBS. The PPBS is a two-year cycle originally designed to produce a Five-Year Defense Plan (FYDP) consisting of one budget year and four "out" years. PPBS has three main

phases: Planning, Programming, and Budgeting. There have been several changes to the process with the latest coming in 1986 when DOD submitted a two-year budget. Figure 1 depicts the PPBS process.

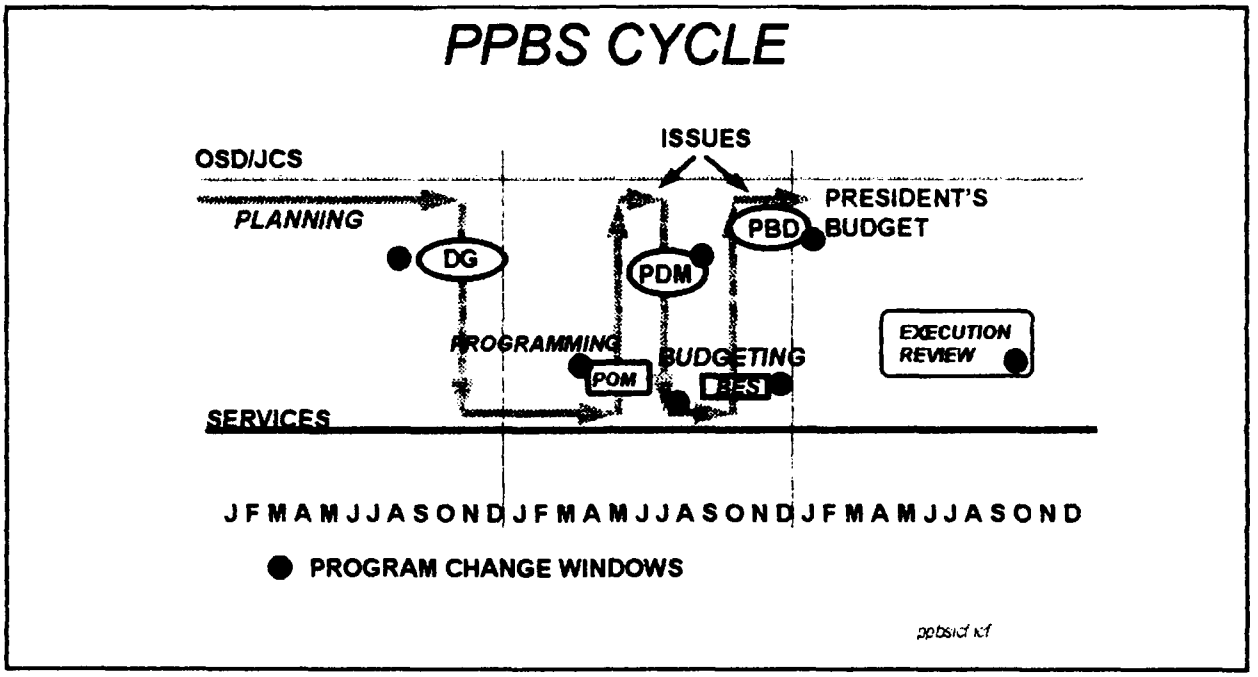

Figure 1

Planning. Once the weak sister in PPBS, planning has grown in importance. Planning starts in February two years prior to the budget year so that the product, the Defense Guidance (DG), is ready for the customer, the services and agencies, by late November--the start of the Programming cycle. The Defense Guidance has four major sections: Policy, Strategic Guidance, Force and Resources Planning, and Major Issues. The DG contains both long term goals and midterm objectives (MTO's). The DG is approved by the Defense Resources Board which is a multi functional committee chaired by the Deputy Secretary of Defense. The recent changes in the Planning Phase have been good. In general these changes have developed a participatory process of the key players in OSD, OMB, the services, and JCS. This multi functional team approach, analogous to the successful multi functional, multi echelon design teams in industry, has produced a more coherent useful product for the customer. Another significant change is the inclusion of resource limitations in the process, both at OSD level and from the JCS. The purist would argue that planning should not be constrained by resources. I disagree--everything in the complex business of translating National Objectives into a defense budget must be continually available for evaluation. Each new cycle of the DG offers one opportunity to change the baseline of a program--thus increasing program instability.

Programming. Programming translates the DG into time phased resource requirements for the FYDP. The fiscal guidance is given to the service by the Assistant Secretary of Defense (Program Analysis and Evaluation). The major product of the programming cycle is the Program Objective Memorandum (POM) produced by each service and agency. The customer is OSD. The POM is developed within each agency and service with the POM due to the Office of the Secretary of Defense in April/May, one year before the budget year. The POM is the principal means for the services to request changes to the previous FYDP. The POM is a multi volume, comprehensive product developed every two years with an Execution Review in the "off" years. After receiving the service POM's and working the issues, OSD issues the Program Decision Memorandums(PDM's) in September. The PDM's approve service programs with changes. A similar Execution Review Decision Memorandum (ERDM) is issued in the "off" year and has the same effect. The programming phase is somewhat multi functional at the service level but is not multi functional at OSD. The primary player at OSD who orchestrates the effort, understands the DG, delves into the details of the POM's, and who has a feel for resources is the ASD(PA&E). Each new programming cycle offers at least **three opportunities** to influence the baseline of a program and cause program instability: the service POM build, the PDM issuance, and the ERDM. The issuance of the PDM starts the Budget Phase.

Budgeting. The product of this phase is a budget at each level that is combined at OSD into the defense budget. The customer is the President (OMB) and Congress. The services take the PDM's and the definitive fiscal guidance (the budget estimate submission guidance) from the DOD Comptroller. Included in the guidance are new requirements and changes initiated by OSD, OMB, and Congress. Translating the PDM's into a budget is a difficult mechanical and structural process where oddities in translation of automated formats can effect program stability. The services prepare their budget estimate and submit them to OSD by 1 October, one year before the budget year. OSD and OMB then jointly review the budget. This review was originally intended to be a simple fiscal check of the entire process but has involved into a detailed analysis of each element by analysts who may not be familiar with the original plan or program. Services find themselves defending the details of programs that took years to develop, to analysts who may or may not understand how the program weaves into the fabric of the FYDP--a dysfunctional conclusion to an inefficient system. Changes in resource allocations often occur for no other reason than the OSD comptroller staffs having a different opinion on resource allocation than those who worked on the DG and the POM! After this procedure the OSD Comptroller issues hundreds of Program Budget Decisions (PBD's). These PBD's do effect program stability. OSD then prepares the Presidents Budget for submission to Congress. Each new budget cycle offers **three more opportunities** to influence the baseline of a program and create instability: the initial fiscal guidance, the service budget submit, and the PBD. If the program manager has survived thus far, his only remaining concern in this cycle is the program instability created in Congress! However, this is the subject of another paper.

WHAT CAN BE DONE?

As shown above the PPBS structurally offers at least seven opportunities to produce program instability per two-year cycle. The average program is 11 years. Therefore, the average successful program has made it through at least 35 PPBS change opportunities! PPBS must be changed to a streamlined process that offers no more than one structural change opportunity per two-year cycle. There are both short and long term solutions to the PPBS inefficiency and it's adverse effect on program stability.

Long Term. The Deputy Secretary of Defense should form a high level process action team to restructure PPBS. The team should start with a clean sheet of paper and build a concurrent, multi functional process that would transform National Military Objectives into a defense budget. The team must be multi functional and multi echelon--people who work the system and outside experts experienced in restructuring failing organizations. One significant product of this effort would be an interactive hardware/software support system that would translate the programs, with absolute fidelity, from the front end of planning to the budget and supporting documents ready for Congress. Danger: This new process will create efficiencies that will eliminate jobs and reduce power--there will be great inertia for no change or a "new" solution that is really a slightly modified PPBS. An entirely new concurrent approach is needed. The DepSecDef should form the core of this team with non government personnel who are experts at the restructuring process. This new approach should have, as a major objective, a maximum of one structural opportunity per cycle to change a program baseline--thus reducing program instability. A suggested name for this new process is the NODBS (National Objectives to Defense Budget System). This would accurately describe the vision and purpose. This concurrent approach will give a quicker budget cycle time allowing for faster budget development or will allow retaining the same two-year cycle with less personnel and resources committed to producing the end product--the Defense Budget.

Short-Term. The Planning phase of PPBS is matriculating toward a participatory, multi functional process. This is an excellent trend. Further evaluate this process to enhance customer participation. Have the customer (the customer defines quality), the services, evaluate the product from this phase, the DG, and make changes as necessary. The major short term change needed to produce a better working PPBS is to combine the Programming and Budgeting Phases into one concurrent phase with the ASD(PA&E) as the lead. The services would build their POM's and matching budgets within their fiscal guidance. This would be followed by a multi echelon review and issue cycle which would produce Budget Decisions (BD's) that would form the Defense Budget. The teams working this new phase must be multi functional and multi echelon. It is important for the budgeteer to understand the plan and for the planner to understand the budget. The short-term solution would also provide faster cycle time with the resulting savings. This change alone would save millions in administrative effort and would reduce the opportunities for structural program instability from seven times a cycle to twice a cycle (the DG and the BD's).

OTHER BENEFITS TO CHANGING PPBS

Changing PPBS to NODBS will give easily identifiable side benefits as well as increasing program stability. The concurrent approach will allow more time for a smaller staff to work the same issues. Additionally, a NODBS system, with a matching information management system, will reduce the number of operators that are currently required to translate the PPBS documents through the various stages--saving personnel costs. The decreased number of briefings will allow a decrease in materials consumed. Mountains of paper will be saved, legions of copy machines can be released back to the leasing agency, and many future computer and printer purchases (purchased only for making briefings) will be avoided--saving operating costs. DOD will save dramatically in travel costs for the hundreds of Program Managers alone since their presence, with their briefcase full of briefing charts, will not be needed seven times each PPBS cycle--saving travel costs. Each time a program is changed or threatened the PM has to contact the contractor and send them through a "what-if" drill. The PM then must pay the contractor for the time spent in these drills--saving overhead costs. Also, every program change carries a program change cost for the rescoping effort--saving contract change costs.

CONCLUSION

Successful industries have changed from a lockstep, sequential, inspect/fix approach to a multi functional, concurrent, team approach. This paradigm shift to building quality "in" has developed products that are world class. DOD must abandon the current outdated model and construct a new process that will produce a quality product with the associated savings. The potential administrative, personnel, and operating savings are enormous. The savings that will come from enhanced program stability are similarly enormous. DOD now has an opportunity to adapt the successful industry model to enhance it's most important product--the translation of National Objectives into a Defense Budget.

APPENDIX F

DEFENSE ISSUES

Vol. 9 No. 49

Technology Reinvestment Project Serves Multiple Purposes

Prepared statement of John Deutch, deputy secretary of defense, to the Defense Technology, Acquisition and Industrial Base Subcommittee, Senate Armed Services Committee, May 11, 1994.

Good morning Mr. Chairman, members of the subcommittee and staff. I am pleased to appear before you today to report on the Technology Reinvestment Project (TRP) and to share my vision of the underlying investment strategy that guides this program.

Let me begin by pointing out that we in the Department of Defense are embarked on the most monumental change to our character and composition in perhaps the last 40 years. We are faced with new threats, some of which we are just beginning to understand.

In many ways these threats are even more menacing than those of the Cold War. While the weapons that threaten us are often less sophisticated than those of the former Soviet bloc, they are often much more difficult to deal with because of their great variation and diversity and their reckless use in urban areas among civilians and noncombatants.

In the past we built a strategy against the superior numbers of the Soviet bloc based on technological advantage. We talked a lot about "critical technologies" and "competitive strategies" and the use of technological innovations as "force multipliers."

But in those days DoD was able to effectively meet these challenges by drawing from its own industrial base that concentrated primarily on maximizing weapon performance and only secondarily on cost. But today the threat has changed, and DoD can't afford to finance its own industrial base any longer.

Nevertheless, we believe that the basic strategy of building around new technology is still sound. The success of today's military hinges on speed, precision and the gathering and use of information to counter a foe that can pop up anywhere in the world, unanticipated, with unknown and even irrational intentions.

But now our use of technology must be in the direction of "force sustainers" and "force diversifiers" for a contracting defense structure by providing new advantages in agility, precision and economy of force. Realizing this, Secretary [of Defense William] Perry has advocated an investment strategy that has resisted major reductions in R&D [research and development], even while pursuing major reductions in personnel and terminating procurement of large and important weapon systems.

Reduced Funding

But regardless of this commitment to direct R&D funding for defense, reduced funding in our procurement accounts will greatly affect the indirect R&D activities of defense companies. For instance, Independent Research and Development activities in defense firms are proportional to procurement budgets, not R&D budgets, and will be greatly reduced just at the time when these firms, knowing that their defense business base is shrinking, require resources to diversify into new directions.

Thus, I believe our goal is clear. The military can no longer finance a separate industrial base, yet its need for new and upgraded platforms and weapon systems has not been eliminated.

For the military to have those products available for acquisition it must transition itself toward procurement within a unified industrial base to which it contributes advanced technology and from which it procures military hardware at prices consistent with commercial competition and appeal.

We believe sincerely that much of same advanced technologies that are needed by defense have great commercial potential, which in turn will stimulate application of private sector expertise and investment to provide higher quality in a shorter time at a lower price. What I am describing, of course, is a "dual-use" economy in which DoD investments are win-win by benefiting both defense and nondefense sectors at the same time.

These ideas are the underpinning of the Technology Reinvestment Project, to vigorously pursue "dual-use" technologies with both purposes in mind from the very beginning. Three objectives stand out.

First, we want to cut the time and expense of developing and maturing critical defense technologies by leveraging the interest and resources of the commercial sector to work with us as partners with common interests and shared risk. Of course, this should reinforce increased emphasis on maximizing our use of commercial off-the-shelf goods and services whenever possible.

Second, we wish to build a "dual-produce" capability in U.S. manufacturing by deploying new manufacturing technologies and methodologies that allow military products to be produced alongside

We intend to exploit existing, high-volume commercial markets for providing critical technologies back to defense at a price that is low.

commercial versions of the same product. By deploying these new techniques, especially to small- and medium-sized firms, we intend to exploit existing, high-volume commercial markets for providing critical technologies back to defense at a price that is low.

Finally, we hope to educate a whole new generation of manufacturing experts which will come to know "dual-use" and "dual-produce" as the routine way of doing business.

As you know, last year at almost this time, the TRP led by ARPA [Advanced Research Projects Agency] and five other nondefense agencies kicked off its first competition. The participation of the other agencies was critically important. It exemplified our understanding that the Executive Branch was prepared to do what we were asking others to do — namely, build on common missions and interests in true collaboration.

In fact, I believe that the first major accomplishment of this program was to show that partnering within and among the government is possible and practical when it makes sense.

Proposals were solicited in three areas: technology development, technology deployment and manufacturing education and training, consistent with the three objectives that I just described. The response was, as you know, enthusiastic. A total of nearly 3,000 proposals were received seeking $8.5 billion of TRP funding to match a proposed $13.1 billion of non-DoD cash and in-kind cost share.

And this brings me to a second very significant accomplishment of the TRP. TRP proposals were solicited from teams, partnerships and consortia of performers who in addition to collaborative performance were asked to share half the cost. The role of the TRP was not as a customer but rather as itself a partner in these collaborative efforts.

Although widespread in both Europe and in the Pacific Rim, joint ventures are not the traditional way of American business, especially among firms with a history of serving DoD. We have observed that the process of the TRP has changed this thinking a bit.

Profitable Relationships

It has been difficult, perhaps even more than anyone anticipated, but defense and nondefense firms, state and local governments, nonprofits and even federal organizations are beginning to recognize the value of new, profitable relationships among themselves well beyond participation in TRP.

We know of joint ventures, stimulated by the TRP, who decided not to apply but rather to begin efforts immediately. Many others that did propose and were not selected have proceeded anyway because they recognized a real potential for gain. In the words of one technology expert in Michigan, "The TRP has already been worth the price of admission."

A third accomplishment, less visible but perhaps even more significant, is the successful development and use of new legal authorities which allow the government to move from old models based on rules and regulations to new models based on goals and relationships.

While not intended as procurement reform itself, I believe the TRP has stimulated important shifts in our thinking about what the new acquisition process should be.

All of this, of course, was well under way before the first TRP selections were announced on Oct. 22 of last year. By the end of January we had announced a total of 212 proposals selected for final negotiation. While we originally advertised a total of $471 million of FY [fiscal year] 1993 funding available for this competition, the number of excellent proposals exceeded that number. In recognition of that we have added another $140 million of the FY 1994 appropriation to bring this first competition to a conclusion. We were very pleased with the broad distribution across the U.S.

Selected proposals involve more than 1,700 participating firms and organizations in 46 states, plus D.C. (District of Columbia). We are very encouraged by the depth and breadth of participation from all sectors of the economy. There was significant involvement from both defense and commercial firms as well as firms which operate in both environments.

More importantly, 80 percent involve both a defense and a nondefense contractor. This is a very indicative sign that the commercial-military integration sought in our strategy has started. Overall, more than half of the selected efforts involve at least one small business. Almost 60 percent involve at least one college or university. State and local governments, federally funded research and development centers, national and defense laboratories all have significant involvement.

As of today, 72 of these agreements worth a total of $203 million have been successfully negotiated using a wide array of innovative, new legal instruments, including heavy use of ARPA's "other agreements" authority. Another 33 agreements worth a total of $64 million are imminent (within two weeks). All others are in some stage of negotiation.

It bears repeating that the other participating TRP agencies are playing a critical role in helping to support the TRP and ARPA in negotiating and managing these efforts. We sometimes refer to them as "agents," but their role goes well beyond mere execution of prescribed contracts. They are becoming full partners in the entire enterprise. Without their help and partnership the TRP would simply not be possible; the manpower required for such an undertaking is beyond anything ARPA could have done by itself.

While ARPA is quite experienced with this kind of relationship with the other military departments, this is generally a new way of doing business for the non-DoD members. It has not been without some growing pains, but we are making excellent progress and I continue to be very optimistic.

The second solicitation under the TRP was announced on April 8. It is intended to be a smaller competition in seven focused technology development areas and the area of manufacturing extension. The focus of this solicitation is tighter than the previous solicitation, primarily due to a desire on our part to provide proposers a much more informed basis on which to make a bid-no bid decision aimed at more efficient use of proposal writing assets.

In addition, we continue to work for the best business model to use in various technology areas. For instance, in the area of flat panel displays we are trying to refine our solicitation in a way that would make TRP cost-sharing for development of future technology contingent on a proposer's willingness to invest in it's capability for manufacturing current generation products.

Manufacturing extension is an area in which the interests of DoD coincide greatly with the Department of Commerce, and I expect that the National Institute of Standards and Technology, with our enthusiastic participation, will pick up the leadership for this important area in the near future. In all, this competition will probably consume roughly $200 million with selections announced around the end of this fiscal year.

We plan to announce a larger, more general competition about the middle of July. Also based primarily on focused technology areas, it will likely include manufacturing education and training as well and be funded by the remainder of the FY 1994 appropriation as well as much of the requested FY 1995 appropriation for a total of perhaps $600 million. Like all previous TRP solicitations, we will be emphasizing strongly that the TRP process is driven exclusively by merit.

Of course, my concern is the issue of earmarks. This is an industry-driven program; we are very concerned that industry maintains

Technology is the tool by which defense and commercial industry can leverage their creative powers to mutual advantage.

confidence in the TRP's ability to evaluate and select projects based on a competition against clear and open criteria. If this confidence is ever lost, all that we are trying to achieve will be lost.

In summary, the TRP is a program which is based in new technology, its creation and utilization in new products. But unlike the R&D investments elsewhere in ARPA and the services, the creation of technology is not the major objective of the TRP. Rather, technology is the tool by which defense and commercial industry can leverage their creative powers to mutual advantage. Likewise, TRP investments will certainly result in new products and new manufacturing processes, and this will certainly lead to new, high-quality jobs for American workers.

Multiple Purposes

But from our point of view the TRP is not primarily an economic stimulus program. Instead we see the TRP as investments that directly support the department's constitutional mission of providing for the common defense. It is a hallmark of the current times that government programs must each serve multiple purposes, and the TRP is a fine example of this at work.

The TRP is rooted in our fundamental belief that many of the same advanced technologies that are critical to defense also propel modern nations into commercial prominence. To exploit this idea in practice, defense firms will have to operate in new ways. They must learn to serve multiple customers not just one, to market products rather than respond to specifications and to regard cost as important as performance.

Many have argued that the TRP is unnecessary, that simple market forces will provide all the stimulus and direction that is needed. While it is true that such a dramatic reduction in the defense budget will assure change, I am unconvinced that change will come in a direction that is consistent with the current and future national security needs of this nation. The TRP, I believe, is moving us in the right direction.

And while I have spent much time saying what the TRP is, it is very important to say what it is not. From the beginning we have maintained that the TRP is driven by opportunity, not simply regional economic need. It was never our intention that the TRP would serve as "disaster relief" for beleaguered defense companies.

The TRP is just one part of the answer. Base closure relief, laboratory consolidation, and community and personnel assistance are all critical pieces. Environmental cleanup and reuse is a problem that DoD shares with other agencies. The TRP is one of an array of mechanisms on which we depend, and we look forward to its continuation in FY 1995 and beyond.

I'd like to talk for a few minutes about the department's new initiative in flat panel displays.

The armed services are rapidly entering an era in which information is the primary currency used to secure both tactical and strategic military advantage, save lives and reduce material losses. Today's battlefields are rich in information from a variety of sensors and data bases, which require individual combatants to be able to react in a rapid, accurate and effective manner to this environment.

Visual display systems are the primary interface between soldiers and their system and a key element of battlefield success. Displays are being implemented in a number of weapon systems today, including aircraft and tank cockpits and will be implemented in future systems ranging from the individual soldier's equipment through the central command post.

Our initiative aims to capitalize on the dual-use nature of displays to provide the best solution for national security.

The National Flat Panel Display initiative is our approach to fulfilling DoD needs in the most cost-effective manner. DoD needs three things in displays and display technology. Those three things are early access to leading-edge technology, assured access to leading-edge technology and affordable access to leading-edge technology.

Conventional approaches building a captive, specialized military supply source miss the tremendous opportunity to capture the vitality and innovation which, in display technology, is clearly driven by commercial requirements. Our initiative aims to capitalize on the dual-use nature of displays to provide the best solution for national security and perhaps the only solution capable of keeping up with a very dynamic technology driven by a vast commercial marketplace.

The initiative continues strong support for the underlying research and development and will coordinate government efforts in order to focus market demand. In addition, a "focused R&D incentives program" makes some R&D funding for work on future technologies conditional on a commitment to a current generation production facility, as an eligibility requirement.

This is appropriate because the Department of Defense ultimately wants to have some reasonable expectation that work it supports will end up in its procurement pipeline and not sit idly on a laboratory shelf. Requiring a visible commitment to the business is a means of testing a potential industrial partner's intentions in this respect.

If a firm is willing to demonstrate its ongoing commitment to being a producer with an investment in manufacturing capacity for current generation products, the Department of Defense will be willing to consider working with that firm on development of feature generations of products and manufacturing processes.

I'd like to emphasize that the program will be competitive, will be open to all flat panel display technologies and will allow foreign participation if it provides a national benefit and meet program objectives. These competitions will be staggered over the next five years, with the first being implemented through the upcoming focused TRP program.

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APPENDIX G

DEFENSE ISSUES

Vol. 9 No. 48

Advanced Technology for Defense and Economy

Prepared statement by Gary L. Denman, director, Advanced Research Projects Agency, to the House Defense Appropriations Committee, April 12, 1994.

Good morning, Mr. Chairman, members of the subcommittee and staff. I am pleased to appear before you today to outline the Advanced Research Projects Agency's (ARPA's) program and to share my vision of the underlying investment strategy that guides this program.

ARPA'S Guiding Principles. By strictly maintaining a set of guiding principles, ARPA has a three-decade history of major contributions to defense technologies and to the economic health of the nation.

Paramount is ARPA's role as an agent for fundamental change. Examples are the creation of stealth technology and networking technology. Fundamental changes can lead to new weapons systems, new tactics and doctrine, and new ways of manufacturing both defense and commercial products.

The second guiding principle is our focus on investments in critical areas that will have the greatest impact for defense and for the economic well-being of the nation. We have maintained ARPA as a small organization with no laboratory structure. This allows us to rapidly respond to new opportunities, but it also means that we have to carefully select only the highest-priority initiatives in which to ... [invest].

ARPA'S Investment Themes

As we prepare for our FY [fiscal year] 1995 program, there are four broad themes that pervade much of what we plan to do:

❑ Exploit advanced information technology. The strategic importance of advanced information technology cannot be disputed. Our national and economic security are increasingly reliant on our ability to have the information we need, when we need it.

For three decades, ARPA's investments in information technology have provided the Department of Defense and industry with the most advanced computing technology in the world. We are committed to continuing a strong research program in information technology and to applying this technology to a broad set of applications.

Our programs in command and control, design and manufacturing, surveillance, the National Information Infrastructure (NII) and simulation are a few of the applications that are critically dependent on information technology. Our advances in information technology have been enabled by our ever-increasing capabilities in electronics, networks, scalable high-performance computing and intelligent systems technologies.

❑ Create affordable defense technology. In the rapidly changing national defense environment and [in light of the] declining defense budget, technological superiority is even more important than in the past. However, high technology alone will not be sufficient to meet the national security challenges of the next decade. The affordability of military systems will ultimately be one of the defining factors that determines the future force structure.

A few years ago, our program was focused almost exclusively on advanced capability. Today our focus is heavily on affordability, with an emphasis on developing manufacturing technologies and processes to reduce costs.

We are investing in technologies for flexible manufacturing, integrated product and process development, and cost-effective manufacturing solutions that are independent of production volume. These are technologies that can reduce component costs, especially electronic components. We are also investing in other technologies that are critical to enhancing affordability, such as advanced distributed simulation for virtual prototyping, virtual manufacturing and better performance/requirements tradeoff analyses.

❑ Exploit dual-use technologies. DoD will become increasingly dependent on the commercial sector for many of the technologies and components used to develop defense systems. ARPA will continue to invest in the creation and utilization of this dual-use technology.

The Technology Reinvestment Project and our other core technology investments will significantly contribute to the viability of military systems, including those military systems which have no commercial counterpart, such as submarines, by fueling the integration of the military-commercial industrial base at the component technology level.

DoD can no longer afford to define and sustain a defense industry solely set apart from civilian industry. Central to this dual-use strategy is to invest in research and development so that the resulting products lead to simultaneous or complementary improvements in both defense and civilian products.

❑ Transfer technology to defense systems. More than any other time in

Our goal is to bridge the gap between our science and technology initiatives and specific military needs.

ARPA's history, technology advances must translate into cost-effective fielded systems with enhanced capabilities and greater flexibility and reliability. We remain committed to developing and demonstrating key military capabilities.

Our goal is to bridge the gap between our science and technology initiatives and specific military needs. We are focused on doing this through integrated research and development, by performing critical experiments and systems demonstrations to assess the military value of technologies and by extensively involving the military user community early on to ensure technology transfer and a clear concept of operation.

Our focus is consistent with DoD's new technology demonstration initiatives known as Advanced Concept Technology Demonstrations, which are designed to bring technologists and warfighters together earlier in the development process. This provides users a rich context in which to evaluate technologically based opportunities for potential changes in operations, tactics, modernization, training and doctrine.

Our investment strategy supports Secretary [of Defense William] Perry's five principal priorities to: implement the bottom-up force structure; protect the force to sustain a strong readiness capability; redirect the modernization program to sustain a strong science and technology program, invest in next-generation systems, focus on near to medium requirements for theater missile defense, maintain a strong intelligence program and maintain selected elements in the industrial base; execute business more responsibly and effectively; and reinvest defense dollars in dual-use technologies.

These priorities, together with the Joint Staff's set of five high-priority warfare capabilities, clearly articulate the department's strategy in response to the changing global environment. I believe ARPA's investment program will position us to effectively and responsibly meet the future defense needs defined by this administration.

ARPA Programs

ARPA invests in programs that can be grouped loosely into three categories: core technologies, infrastructure and military applications. These categories serve to provide a broad grouping of the research thrusts at ARPA and are not meant to be all-inclusive.

Core technology areas include technologies in which ARPA has made sustained investments for many years and which must continue to be supported in order to maintain U.S. military superiority. ARPA will continue to have major investments in information technology, electronics technology and materials technology that will enable DoD to rapidly and cost-effectively develop, acquire and maintain the next-generation military capability such as advanced radars, multispectral sensors, and command and control systems.

Manufacturability and affordability are as important as meeting performance, size and weight requirements. Increased emphasis will be placed on achieving these capabilities through experimentally compatible manufacturing processes.

Most of ARPA's core technology programs are dual-use technologies and augment the Technology Reinvestment Project initiatives.

Information Technology

ARPA continues to invest in information technology and exploit the power of information technology in a wide range of applications, including simulation, design and manufacturing; health care; critical mobile targeting; surveillance; and many other areas.

Our strategy is to create the enabling technologies and to ensure that we have a robust industry that can supply the necessary products for leading-edge DoD applications. This is especially true in the High-Performance Computing program, where the creation of a scalable computing technology base represents a paradigm shift from sequential processing into the use of parallelism. The National Information Infrastructure (NII) is a new area of investment, but one which draws on extensive ARPA investments in networking, computing and software technologies.

Our goal is to participate with other agencies to evolve the NII into a national capability that can support defense needs as well as those of the commercial sector. The ARPA NII contribution will be in the area of high-performance networking technology software services to support interoperability across applications and pilot projects for selected application domains.

High-Performance Computing and Communications. Many of our primary efforts in information technology are embodied in the High-Performance Computing and Communications program, where we have focused on developing high-performance computing elements that can be arrayed and scaled to achieve ever-higher levels of performance.

At the heart of today's most powerful massively parallel machines are the same microprocessors found in relatively inexpensive desktop workstations and personal computers. And the high-speed interconnection technology found in these scalable machines will form the basis of tomorrow's high-speed communications network switches and processor cluster interconnections.

Our FY 1995 program has been expanded and will continue the aggressive development and implementation of U.S.-based computing capability. Four areas will receive expanded investment:

- ❑ Embeddable systems that will exploit the dual-use commercial base to dramatically improve military high-performance computing;
- ❑ Networking technology that adds security, high-performance experimental test beds and scaling for additional users in mobile and wireless configurations;
- ❑ Increased software activities to

exploit the state-of-the-art compiler, library, operating systems, object management systems and environments; and

❑ Computational prototyping technology, which is now ready to be exploited for complex problems.

Software Initiatives. Crucial investments are also being made in software technologies that will significantly improve our capabilities to cost-effectively acquire, deploy and maintain operational software systems. These programs are centered on developing architecture-based development approaches that will allow the rapid construction of application software systems from well-specified interfaces, commercial off-the-shelf software , domain-specific components and high-level, domain-specific languages.

Complementary efforts address improving the ability to prototype aspects of software prior to actually building systems, developing techniques to greatly facilitate user involvement in software life-cycle evolution and developing advanced integration techniques to better enable software tools to work together. In addition to development we are actively evaluating and transitioning those technologies that appear to be maturing. This transition is accomplished through detailed demonstration projects with the military departments and is accomplished under real-world conditions and constraints.

Several of the techniques being used (domain analysis techniques and associated reuse support tools, layered software infrastructures and product line development approaches) have already demonstrated significant productivity and quality increases. ARPA intends to use this and similar approaches as a standard means of maturing software technology to the point of production use and commercial spin-off.

In FY 1995, under our Software Technology for Adaptable, Reliable Systems program, we will complete initial integration of software re-engineering and reuse technologies; develop at least one example of layered software infrastructure; evaluate and introduce into use three application systems using our software product line philosophy; and commercialize several software tools and environments resulting from our development activities. We will also validate at least one advanced prototyping language and architecture description language and will deliver techniques to help developers assess, evaluate and mitigate risk in software systems development.

Intelligent Systems. An intelligent system is a software-based system that uses artificial intelligence methods to assist human problem solving. The goal of our intelligent systems research is to enable such systems to be built easily and to assist humans in solving complex problems in a variety of military and dual-use domains.

Such systems will be easy to use since they will support "hands-free" computing (that is, natural interaction through spoken language and multimedia interfaces). We have a robust program in intelligent systems focused in five areas: spoken and written language technology, image understanding, human-computer interaction, planning technology and information integration technology.

In FY 1995 we will continue to extend the functionality of these intelligent systems technologies, as well as continue to demonstrate applications in domains such as command and control, health care, manufacturing and autonomous vehicle control. Also in FY 1995 we will investigate a new demonstration application for intelligent systems in training and education.

Electronics Technology

Supportive of our investments in information technology are the numerous investments ARPA sustains in electronics technology. The goal of our electronics technology program is to develop the capabilities necessary to produce smaller, lower-power, more mobile and more affordable defense and commercial systems.

Semiconductor and integrated circuit technology and low-cost physical electronic packaging that yield high-performance multiple circuits, as well as the associated manufacturing process technology necessary to produce these products at an affordable cost, are being pursued. Microelectromechanical systems and high-definition systems, both important ARPA programs, are also being pursued under our electronics technology program.

Electronic Packaging. Several ARPA programs can be grouped into the electronic packaging area. Following are three of our most critical programs in this area:

❑ Application Specific Electronic Modules (ASEM). The ASEM program goal is to ensure the existence of an end-to-end capability to rapidly acquire electronic modules and subsystems. In addition to integrating the key capabilities of design, manufacturing and test, the program also addresses the information technologies and infrastructure needed for rapid acquisition. In FY 1995 we will heighten our emphasis on mixed signal modules and application demonstrations.

❑ Multichip Modules (MCM). The MCM program will produce an order-of-magnitude reduction in manufacturing cost, developing a domestic supplier infrastructure and accelerating the acceptance and insertion of advanced multichip module technologies. We are focusing on further development of manufacturing equipment and plan to deliver production modules for military aircraft in FY 1995.

❑ High-Density Microwave Packaging. New approaches being pursued under the High Density Microwave Packaging program are expected to reduce microwave packaging costs by as much as 75 percent while providing excellent electrical performance. Packaging is a major component of the cost of microwave frequency systems. A particular challenge is to meet, at the lowest possible cost, demanding electrical performance requirements without incurring excessive signal losses.

The FY 1995 program is focused on the continued development of microwave frequency multichip module housings, internal packaging interconnections, array interconnect technology, module assembly and integration, and computer-aided design tools and databases.

SEMATECH is the premiere example of ARPA's sponsorship of a true dual-use technology program through cooperative partnerships and cost sharing with industry. This partnership includes companies that supply the majority of the integrated circuits in the United States.

ARPA's FY 1995 efforts will

ARPA's FY 1995 efforts will continue to focus on the manufacturing tools and methodologies needed for low-cost, flexible, scalable manufacturing.

continue to focus on the manufacturing tools and methodologies needed for low-cost, flexible, scalable manufacturing to meet defense and commercial needs. Emphasis will be on combining advances in manufacturing equipment with software innovations to enable state-of-the-art microelectronics manufacturing facilities capable of producing many part types in rapid turnaround time and with reduced cost sensitivity to manufacturing volume.

The primary strategy at SEMATECH is to stay very focused on sustaining the improved productivity trends that the industry has achieved over the past number of years. These productivity gains are, in large part, a result of improved processes, equipment and factory integration. These areas will continue to receive priority investments at SEMATECH, with a large portion of the joint industry/government funding going to key industrial suppliers.

Lithography is one of the most critical components of semiconductor manufacturing lines in terms of achieving desired competitive product capabilities. It is also one of the highest-cost areas in terms of both capital equipment costs (typical systems can be over $1 million) and development costs for the next-generation systems.

This past year has been extremely volatile. The number of industry players has declined dramatically, and one player has announced intent to partner with foreign firms. Currently Japan (Nikon and Canon) dominates this market. In the United States it appears that only Silicon Valley Group (SVG) will be competitive for leading-edge lithography systems.

Since this industry shakeout two aspects have unfolded:

- The Semiconductor Industry Association, in cooperation with SEMATECH, has taken on the job of rebuilding the industry investment strategy.
- U.S. industry is increasingly expressing its intention to work with SVG, primarily through equipment purchases.

Given this unstable industry status, ARPA has reduced its support to lithography in FY 1995. However, we are aggressively working with the industry to redefine an investment strategy. We are confident that this strategy will be in place for our FY 1996 budget cycle.

Microwave and Analog Front End Technology Program is a new start for FY 1995. The program will build on successes of the Microwave and Millimeter Wave Monolithic Integrated Circuits (MIMIC) program and, for the first time, will result in the capability to produce an affordable, all-weather fighting capability; very compact, lightweight, low-cost active arrays for radar, communications and improved missile accuracy; and to integrate multiple military system functions, effectively and inexpensively. Dual-use applications exist for safety, communications, and medical devices and procedures.

Low-Power Electronics. Working with industry and other DoD components, ARPA has defined an innovative program in low-power electronics to develop the technology base. The goal is to reduce power dissipation to 1 percent of that used in current state-of-the-art microelectronic-based systems. This program responds to industry's recognition of power dissipation as a showstopper in next-generation portable electronic products.

Microelectromechanical systems (MEMS). ARPA's MEMS program is using the same fabrication processes and materials that are used to make microelectronic devices. It conveys the advantages of miniaturization, multiple components and integrated microelectronics to the design and construction of electromechanical devices.

We are pursuing applications in miniature inertial measurement units for personal navigation, mass data storage devices, miniature analytical instruments, noninvasive medical sensors, fiber-optic network switches and distributed unattended sensors for environmental and security surveillance. In FY 1995 we will lower the barriers to access and commercialization of MEMS applications by developing an infrastructure to support shared, multiuser design, fabrication and testing.

High-Definition Systems (HDS). ARPA's HDS program encompasses the development of a wide variety of associated technologies including displays, display processors, sensors, software, packaging and manufacturing. The program's overall goal is to achieve a design and manufacturing capability that can provide for and sustain the affordable use of high-definition technology in DoD systems in the late 1990s and beyond.

Display efforts include improved cathode-ray tubes; flat panel and head-mounted displays using active-matrix liquid crystals, electroluminescence, plasma and cold-cathode technologies; projection displays using digital micromirrors, liquid crystals and laser projection as well as efforts in manufacturing and enabling technologies.

We are developing strategies that will provide incentives to industry to build product facilities for the dual-use market.

Infrared Focal Plane Array Program. This program will establish a flexible infrared (IR) focal-plane array fabrication capability which can respond to rapidly changing system requirements by producing IR images at affordable cost, independent of the production volume.

The capability will encompass IR semiconductor manufacturing, cryogenic packaging and sensor assembly, integrated with a factory control system. In FY 1995 we will complete the assembly of this advanced manufacturing facility and begin preparations for comprehensive process testing and verification.

Materials

ARPA has a focused program in materials and processes that promises to improve the manufacture and performance of materials that have the highest payoff for military systems. This includes investments in

both structural and electronics materials.

Our investments in structural materials, especially composites, concentrate on improving cost-effectiveness of processing and manufacturing as well as on improving the physical performance in terms of strength-to-weight, durability, thermal capability and geometric tolerances.

Our investments in electronics materials focus on improving manufacturability, reducing size and weight, increasing speed, reducing system complexity and lowering overall cost for electronic and optoelectronic components and systems.

Highlighting our FY 1995 program is our research in metal matrix and advanced polymer matrix composites and high-temperature superconductivity.

Infrastructure, our second investment category, refers to those technologies and capabilities that enable DoD to produce its material and train and care for its personnel. With the drawdown of forces and decreasing defense budgets, there is a critical need to invest in research and development that can make the DoD infrastructure effective, efficient and affordable.

The trend will continue to move toward a shared national infrastructure with greater reliance on the civil sector to support defense needs. Our investments in the defense infrastructure include design and manufacturing, health care technologies, education and training, and technologies that support the NII.

Design and Manufacturing. ARPA has several design and manufacturing initiatives continuing in FY 1995. Our goal is to invest in design and manufacturing technologies that will reduce product life-cycle costs by improving design efficiency and factory operations.

For example, we are developing and demonstrating an integrated suite of computer-aided design/computer-aided engineering work stations for integrated product and process development and in technologies for advanced engineering and manufacturing design.

These capabilities will support rapid product redesign in response to changes in requirements; facilitate performance, cost and schedule tradeoffs in product development; and ultimately result in product and process models that can be shared, reused and merged with other models.

Another more specific manufacturing application will demonstrate the ability to substantially reduce the cost and development schedule of high-performance electromechanical devices such as missile seekers.

Defense Health Care Technologies. We have initiated a five-year program to focus primarily on battlefield combat casualty care and a synergistic research development effort for a health care information infrastructure.

Our efforts in battlefield combat casualty care will enable remote diagnostic and imaging capabilities, telesurgical-mentoring and remote telepresence surgery, and the exploitation of virtual reality and computer-generated human body simulators to allow combat surgeons, medics and others the opportunity to "train and practice" combat casualty care.

Our efforts in health care information infrastructure are designed to enable the transfer of information in the battlefield through the development of a clinical associate and are designed to connect proactively to medical and health knowledge bases to support its users.

Education and Training. We will focus technologies that will improve the delivery and quality of education and training systems by leveraging advances in simulation technologies combined with advances in networking, artificial intelligence, collaborative software, authoring tools and software engineering.

Our goal is to combine these advances to provide inexpensive and flexible education and training systems, quickly tailorable by both trainers and students, that ... [are] accessible — online and on demand for research and instruction.

National Information Infrastructure. The final infrastructure investment area ARPA is focused on is the National Information Infrastructure. Here ARPA is investing in a number of vital research programs in the areas of networking technologies, a variety of services which exploit the use of networks and applications which are critical to both DoD and the commercial sector.

To meet the needs of the NII, ARPA is working with the research and business communities to produce networking technologies to interconnect high-performance computing systems as well as extending today's technology to meet the requirements of nationwide and global networking.

Research programs seek to develop proof-of-principle demonstrations of advanced infrastructure capabilities. These demonstrations, often in the form of advanced test beds, provide experimental infrastructure capabilities which can then be formalized and systematized into broad, coherent information platforms. These test beds and models are developed in cooperation with industry to accelerate their transition into commercial off-the-shelf products and services that provide the greatest possible economies of scale to suppliers and end users.

Military Applications

The final investment area category, military applications, includes innovative technology development in support of improved, affordable military capability. These investments focus on combat vehicles, surveillance systems, command and control systems, counterproliferation concepts and precision-strike capabilities.

Applications cover the broad spectrum of military-focused investments — from a component system such as a radar to an aircraft or ground vehicle to a "system of systems" (i.e., a system created through the integration of assets designed to address complex military operations, processes and problems).

The Common Affordable Lightweight Fighter (formerly ASTOVL) is paving the way toward fielding an affordable, joint-strike fighter for the Air Force, Navy and Marines. At the heart of this concept is the short takeoff, vertical-landing propulsive lift system. For the naval services variant of our concept this system replaces the structure required to enable shipboard-arrested landings and catapult takeoffs.

The propulsive lift system weighs about the same as the keel structure, high-lift devices and high-sink landing gear it replaces. However, it is designed as a removable module to be replaced by additional fuel

In FY 1995, we will initiate a low-cost radar program aimed at improving wide-area surveillance for the detection and classification of time-critical targets.

capacity (and attendant combat range) on the Air Force variant of the aircraft. We believe this innovative approach will permit the Air Force to field an aircraft that shares a common airframe, engine and avionics with the naval services.

As part of this program, ARPA is also exploring innovative design, manufacturing and management techniques to reduce costs and improve quality. Future efforts for an aircraft demonstration, if proposed, will be cooperative with the Joint Advanced Strike Technology program.

Simulation-Based Ship Design. The simulation-based design (SBD) program integrates advanced computational and simulation technologies and enables remotely distributed, collaborative teams to jointly conceive and design a ship and a ship production system using computer simulations. SBD also permits the design to be thoroughly tested in a virtual environment simulating actual operational conditions. This will reduce or eliminate the need for costly physical mockups. The simulations can also be used throughout the life of the ship to plan for and reduce the time and cost of layout, construction, operation, maintenance and training.

Precision Strike and Counterproliferation. ARPA is addressing two critical military capability needs as specifically outlined in the Joint Chiefs of Staff capabilities requirements document. These are precision strike with emphasis on time-critical targets and counterproliferation of weapons of mass destruction.

Enabling these capabilities requires highly integrated systems. Also, both of these applications depend on surveillance technologies that include major emphasis on sensors such as advanced radar, electro-optical and infrared sensors, miniature ground sensors and technologies that will turn sensor data into information to support civilian and military decision makers at the national, theater and operational levels. ARPA's Counterproliferation and War Breaker programs are being developed as two complementary applications operating at different points along the peace-crisis-wartime continuum.

❑ Counterproliferation. Programs are being planned to support detection, monitoring and interdiction of states and extranational organizations producing or acquiring weapons of mass destruction. Operating during peacetime and crisis, such a system will include specialized sensors, data correlation and information fusion, process models and simulation, and response-option technology.

The investment strategy for counterproliferation concepts involves identifying and customizing efforts under way in ARPA's traditional technology base of information, electronics and manufacturing technology. The program is an agencywide program with potential technology insertion points in the intelligence community, DoD, the military departments and the departments of State and Commerce. This is a new initiative for FY 1995.

❑ War Breaker demonstrations are aimed at the crisis and wartime portions of the peace-crisis-wartime continuum. The War Breaker goal is to support national and theater commanders with sensors that can locate time-critical targets despite their inherent mobility and the employment of operational deception techniques; information processing technology that provides "actionable intelligence," allowing U.S. and allied forces to operate inside the strike cycle times of an opponent's weapon systems; and the next generation of smart weapons that target a wide range of manned and unmanned precision strike options.

One of the many time-critical targets War Breaker technology is focused on is potential delivery systems for weapons of mass destruction that can be used against U.S. deployed forces or regional allies. ARPA's Counterproliferation Program provides a front end for War Breaker's precision strike technology by supporting warning, vulnerability assessment and option generation, while War Breaker supplies the hardware and software to counter weapons of mass destruction once they enter a potential adversary's force structure.

In FY 1995, we will initiate a low-cost radar program aimed at improving wide-area surveillance for the detection and classification of time-critical targets. We will also field components for an integrated intelligence correlation system and will work closely with the Army to demonstrate War Breaker battle management technology.

Command and Control Technologies. Building on past investments in information, electronics and surveillance technologies, ARPA will develop command and control technologies and concepts that will significantly improve battlefield management and provide superior decision support to commanders.

In our efforts to address the information needs of commanders and their staffs in the post-Cold War era we are focused on technologies that will provide commanders rapid, wide-area communications; ready access to and analysis of distributed inhomogeneous databases; an ability to perform rapid, automated planning functions with physically separated personnel from all three services (collaborative planning); the location, status and direction of friendly and enemy forces on electronic maps (situation awareness); and access to models and virtual environments and imagery from various sources.

We are also focused on the development of intelligent decision aids and planning tools to support joint crisis management planning and execution. Rapidly evolving doctrine for crisis management, in particular for joint task forces, provides a critical domain in which to develop new planning and decision-aiding technology using evolutionary software development methods and advanced artificial

intelligence methods.

We are working closely with nondefense crisis management agencies (i.e., the Federal Emergency Management Agency and the Department of Justice) to ensure dual-use application of our intelligent decision aids and planning tools.

Other Military Initiatives

Operations Other Than War (OOTW). ARPA is beginning a program to address new capabilities needed in operations other than war, such as peacekeeping, peacemaking and disaster relief. Today's soldier often finds himself immersed in situations with uncertain and sometimes conflicting objectives. Our forces are called upon to perform missions under rules of engagement that require considerable restraint in the face of an unpredictable and often dangerous elements.

Except for the fact that they occur on foreign soil, these missions frequently resemble law enforcement scenarios more than the battles for which our soldiers are trained and equipped. The challenge is to develop and apply technologies which will enable our military to operate in relative safety and with deliberation, exerting only the force necessary to do the job. In response to this challenge ARPA is focusing on five areas of capabilities enhancement: information systems; sensors/surveillance/detection; mission kill/less-than-lethal systems; protection; and simulation.

We will adapt technology being developed throughout ARPA such as the Low-Cost Uncooled Sensor Project, Microelectromechanical Systems, autonomous translation, and biomedical systems to meet the special needs of OOTW.

The convergence of mission scenarios and operational needs between the military and law enforcement communities is prompting a memorandum of understanding between DoD and the Department of Justice to pursue mutually attractive technologies. This will result in an exciting, joint-agency program which ARPA will lead on behalf of DoD.

Littoral Warfare Efforts. ARPA's littoral warfare programs are focused on improving the performance and affordability of shallow-water, anti-submarine warfare (ASW) and mine countermeasures systems. These ASW programs are optimizing sonar performance within the limitations imposed by the shallow-water environment and developing the complex information processing systems needed for an integrated display of the ASW scene.

Technologies are also being developed for clandestine mine hunting and neutralization by unmanned vehicles in shallow water. To enhance the effectiveness of unmanned vehicles for littoral warfare ARPA is developing a fuel cell to provide a fourfold increase in endurance, as well as advanced underwater communications to provide a fiftyfold increase in data rate.

The Synthetic Theater of War (STOW) is the lead element in ARPA's Advanced Distributed Simulation Program, which is designed to exploit rapidly evolving communications, software and computer technologies into a simulation-based system of systems which will significantly alter the way DoD does business.

Based on virtual simulation technologies proven in the earlier ARPA Simulation Network program, STOW is developing a simulated, complex, highly dynamic multidimensional battlespace which portrays doctrine with virtual and live forces in a single seamless environment that possesses all the essential characteristics of the real battlespace. It will integrate live, virtual and constructive simulation in late 1997 to demonstrate the capability to train the headquarters elements of a joint task force.

In FY 1995 we will begin our formal STOW systems engineering and integration effort, and the development of component force representations to be integrated into the final system.

Technology Reinvestment Project

In FY 1995 the Technology Reinvestment Project (TRP) will continue to be the cornerstone of our dual-use technology investment strategy. We will continue to lead the TRP, with implementation the multiagency Defense Technology Conversion Council, whose members include ARPA (chair); departments of Commerce (NIST [National Institute of Standards and Technology]), Energy, [and] Transportation; the National Aeronautics and Space Administration; and the National Science Foundation.

TRP Strategy. The TRP is rooted in the doctrine that our defense strategy depends on maintaining technological supremacy over those who threaten our security. Its ultimate objective is to preserve defense access to our most critical technologies even where DoD can no longer afford to be the primary investor.

It builds heavily on the recognition that much of the same advanced technology required by defense has great commercial potential, which in turn will stimulate application of private sector expertise and investment. Consequently, we will vigorously pursue "dual-use" technologies with both purposes in mind from the very beginning. We have three major objectives:

First, we want to reduce significantly the time and expense required to develop and mature critical defense technologies by attracting the interest and resources of the commercial sector to work with us as partners with common interests and shared risk — a dual-use development strategy.

Second, we want to build a "dual-produce" capability in the U.S. manufacturing base by deploying new manufacturing technologies and methodologies that allow military products to be produced alongside commercial versions of the same product. By deploying these new techniques, especially to small- and medium-sized firms, we intend to exploit existing, high-volume commercial markets to provide critical technologies back to defense at a price that is affordable.

Finally, we hope to educate a whole new generation of manufacturing experts which will come to know "dual-use" and "dual-produce" as the routine way of doing business.

FY 1993 Status. The strategy outlined above is reflected in the three activity areas of the TRP: development, deployment and manufacturing education and training. To date, 212 projects have been selected for negotiation, committing $605 million in federal funds. This included all of the FY 1993 funds ($465 million), plus an

Health care has also emerged as another strong area with efforts in health care information as well as projects to improve health care diagnostics.

additional $140 million from FY 1994 to ensure that all proposals that were rated "highly recommended" at the end of the FY 1993 evaluation process were funded. Since each of these efforts must be cost shared by at least 50 percent, this represents a total project value of almost $1.5 billion.

In the technology development area projects were selected to benefit the DoD in at least three ways. Spin-off efforts were selected for the purpose of preserving DoD access to critical technologies by creating or enhancing commercial markets for them. Spin-on projects were selected where there was evidence that, with additional development, DoD could use existing commercial technologies. Dual-use efforts were selected for their potential in new technologies, which enable both commercial and defense products.

If the TRP is examined from a technology point of view, several major themes emerge including National Information Infrastructure, transportation and health care.

TRP will make a significant contribution to the National Information Infrastructure. About $95 million of the $350 million of technology development funds is going to projects to develop software or devices that directly support advances in the NII, while an additional $25 million is for projects to advance technologies that support the general industrial capability from which NII devices and hardware are developed.

Transportation and transportation infrastructure proposals received over 35 percent of the technology development funding. All modes of transportation (aviation, shipping, rail and automotive) were represented.

Health care has also emerged as another strong area with efforts in health care information as well as projects to improve health care diagnostics.

Because all the programs are cost-shared, the actual funding applied to these areas as a result of the TRP selection is doubled. Furthermore, because all TRP projects are directed toward eventual productization and have a demonstrated commitment from the proposers, the impact of these efforts will be more immediate than traditional R&D [research and development] programs.

Efforts in technology deployment, including the manufacturing extension programs funded by TRP, are ensuring that small companies — the backbone of the U.S. industry — will have access to the technology and infrastructure they need to establish themselves in the new, dual-use arena. The manufacturing education and training programs will also have a long-term impact on defense industrial base as changes in manufacturing curricula begin to make U.S. industry more competitive.

Deployment projects are aimed particularly at small- and medium-sized manufacturers who have the best opportunity to become "dual-produce" enterprises. The main objective is to help these entities identify and incorporate technologies of all kinds appropriate to their needs and level of sophistication so that they can compete in global-commercial environment.

The interests of DoD coincide greatly with the Department of Commerce, and I expect that the National Institute of Standards and Technology, with our enthusiastic participation, will pick up the leadership of this important area.

Manufacturing Education and Training (MET): The really new and influential ideas will enter our manufacturing processes partly because of projects like those funded in the MET part of TRP. These programs, built around our institutions of higher education but led by industry, will raise manufacturing to a level on a par with our other scientific and engineering disciplines.

Lessons Learned. As we assess the industry feedback from the FY 1993 program, two key areas for improvement have emerged.

- We must improve the success rate of proposals in order to reduce the bid and proposal costs incurred by industry. The conservative estimate is that industry invested more than $100 million in proposal preparation and partnering.
- We must improve the ability of small businesses to cost-share TRP efforts. I am hopeful that the provisions in the FY 1994 legislation permitting small business to use Small Business Innovative Research funds to cost-share will have a major impact on this problem.

FY 1994 Program. In order to deal with the first issue described above we are making changes to our implementation strategy in FY 1994.

First, we plan two solicitations. Both solicitations will have a better focus of topic areas while, at the same time, sufficient breadth to permit the best ideas to flow. Also, we will hold workshops with industry in each topic area to convey our objectives to industry.

For the first solicitation we will include well-defined topic areas to make sure industry understands our needs. Also, in the second announcement we will use white papers to screen ideas before industry expends the resources to prepare full proposals.

In preparation for these announcements we have concentrated our energies on defining the focus, or topic areas, for the expanded technology development portion of the program.

For the first announcement we have defined seven areas that we believe are clearly ready to move forward. The focused competition topics are closely aligned to complement our overall investment strategy. The topics include high-density data storage systems, object-oriented technology for rapid software development and delivery, interoperability testbeds for the National Information Infrastructure, high-definition systems manufacturing, low-cost electronic packaging, uncooled infrared sensors and environmental sensors.

We have worked closely within our interagency group and sustained a continuing dialogue with industry

to define these topic areas. The key selection criteria have been military need, a clear dual-use potential, relationship to national priorities and sound technical ideas. We also considered gaps from the FY 1993 program, and we are assuring compatibility with the larger ARPA dual-use investment strategy.

We have recently announced the first 1994 solicitation aimed at technologies that are both critical to defense and that have clear potential for market growth. This competition should use about $150-$180 million of the FY 1994 funding. It will be followed this summer by a larger, more general competition that will use the remainder of our FY 1994 funds and provide proposals that might be applied to a substantial portion of our $625 million FY 1995 funds.

TRP in Perspective. Technology itself is not an end goal of the TRP. All three elements of our TRP strategy use technology to stimulate fundamental change.

In the TRP technology is a means to an end; that is, we are using the TRP to stimulate integration of the defense and commercial industrial bases. The collaboration/partnership model is another important tool which we are using to move from the transaction-based model of the past to relationship-based models already in place throughout the rest of the world.

Finally, the policy of cost-sharing is an important stimulus, not so much because it doubles our investment but because it guarantees the continued commitment of each participant by sharing both the risk as well as the benefit.

The creation and use of new legal authorities and instruments is another very important tool. For example, TRP is making extensive use of the "other agreements" authority provided to it by Congress several years ago. This is one small piece of the much larger and more difficult job of procurement reform being considered by Secretary Perry and Deputy Undersecretary [of Defense for Acquisition Reform] Colleen Preston.

While I have spent considerable time outlining what the TRP is, it is very important to say what it is not. Our mission is to stimulate the merging of the defense and commercial industrial bases into a single industrial base that can provide the highest performance military systems in the world at a low cost consistent with simultaneous commercial appeal.

From the beginning we have maintained that the TRP is driven by opportunity, not need. It was never our intention that the TRP would serve as "disaster relief" for beleaguered defense companies.

We realize that the TRP is not the whole answer. Our strategy depends heavily on the other and larger elements of the defense conversion/reinvestment initiative.

No one issue is more important or more difficult than enduring reform of the DoD procurement system. Base closure, laboratory consolidation and community assistance are all critical pieces. The TRP is one of an array of mechanisms on which we depend.

Management Challenges

Manpower and Personnel. The essence of ARPA is people, ideas and organizational flexibility.

The substantial growth in the ARPA budget, in the Technology Reinvestment Project and other dual-use and military capability programs — together with the increasing emphasis on new contracting practices, governmentwide collaboration and greater program complexity — severely challenged our manpower resources last year.

The exceptional ARPA technical, financial and administrative staff has shared the burden of agencywide increased workloads. Fully expected, the staff has demonstrated remarkable professionalism and dedication in rising to meet these difficult challenges.

Fortunately, ARPA has been authorized an increase in staff, and we are identifying and bringing individuals on board ... as quickly as possible. However, this process will likely take the remainder of the year to accomplish.

I am also concerned that the tour of duty for civil service program managers at ARPA is increasing. In 1978, 75 percent of the civil service program managers had been assigned to ARPA for less than four years and only 4 percent had been with the agency for more than eight years. Currently, 46 percent of the ARPA program managers have less than four years at the agency and 19 percent have been in place for more than eight years. This is an unfavorable trend.

The more stringent ethics regulations designed to close the revolving door between government and industry contribute to this trend. However, there are other factors involved. The recruitment of the best and brightest talent from industry is seriously hindered by the current disparity in pay and the lengthy and unwieldy government hiring process. This is particularly evident in attempting to recruit for the senior-level ARPA office director positions.

Earmarks. One of the key elements of ARPA's past success has been our ability to be focused and selective in the funding of research and development efforts. We simply cannot afford to follow all possible paths or single-handedly support all of the worthwhile science and technology in this country.

We must continue to be the spawning ground for innovative ideas that have the potential to grow into programs of major impact to the DoD/civilian industrial base. Our ability to maintain this unique flexibility is being threatened.

One of the most serious management challenges that ARPA continues to face is a result of congressionally mandated budget restrictions. About 70 percent of our budget is restricted because of congressional earmarks, congressional fencing or congressional reprograming directions. This results in a significant loss in flexibility to identify breakthroughs and move out quickly on promising technologies.

In addition, specific earmarks contained in report language conflict with the required competitive process and demand enormous time and effort from the professional staff to discern the specific intent of the associated legislation and prevent program awards to the best proposals.

Accomplishments

ARPA has a history of consistently pushing the outer boundaries of the most advanced technologies; the last year was no different. Our accomplishments year include both breakthroughs in core technologies as well as several system accom-

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plishments. Some of these accomplishments are highlighted below:

Taurus. On March 6, 1994, Taurus lifted off the pad at Vandenberg Air Force Base, Calif., on its maiden voyage to place two DoD satellites into low-earth orbit. After a 10-minute flight, Taurus deployed the DARPASAT and Space Test Experiment Technology for Autonomous Operational Survivability satellites into the targeted 290-nautical-mile orbit.

This event is extraordinary because the mission involved the combined demonstration of a new launch vehicle, two new satellites, new advanced space technologies and new approaches to satellite operations. The impact is truly a fundamental change in the way space systems can be built, launched and operated. ARPA successfully demonstrated capability and affordability.

MEMS. This year an ARPA-supported microelectromechanical systems project has developed motion-detecting components with the sensitivity and stability needed to build personal, inertial location devices. Augmenting existing GPS [Global Positioning System] systems, MEMS-based inertial trackers will provide personal location information even under heavy foliage or in urban environments.

Another ARPA project demonstrated a MEMS-based accelerometer capable of surviving and operating in the near-100,000-G accelerations generated by firing artillery shells. Such devices will provide affordable guidance systems to what are presently unguided munitions, thus increasing the effectiveness of these weapons and reducing procurement and logistic costs.

ARPA has also supported the establishment of a regularly scheduled, shared, MEMS fabrication service for domestic commercial and academic users. The service has allowed hundreds of students and industrial users, nearly half for the first time, to inexpensively and rapidly fabricate MEMS devices.

MIMIC. The MIMIC program has established a solid infrastructure for microwave monolithic integrated circuit (MMIC) technology. As a direct result of the MIMIC program, the U.S. Army Space and Strategic Defense Command was able to select a solid-state approach to the development of a large ground-based array radar. Over 68,000 solid-state modules for the system will be produced from June 1993 through January 1995.

During the past year a number of high-performance millimeter-wave frequency MMICs have been produced on the program, including a high-power, highly efficient power amplifier and very low noise receiver amplifiers. Components such as these have enhanced the performance of millimeter-wave frequency weapon systems under development including both Longbow [Army Apache attack helicopter follow-on] and SADARM [artillery-fired anti-armor projectile].

Commercial applications for MIMIC have proliferated as well. During the past year radar systems have been installed in school buses in several counties in Indiana. These systems warn school bus drivers when children are near the bus yet out of the driver's sight. The systems are assembled using the same flexible production line that assembles military radar transmit and receive modules. The school bus radar uses an adaptation of military radar chips, produced in the same MIMIC foundries that fabricate the military chips.

Militarized Scalable High-Performance Computing. ARPA's High-Performance Distributed Experiment and Embeddable Systems Programs continue to demonstrate results which have a major impact in the future deployment of military computing systems.

For example, in March 1994 the Aegis program office, in coordination with ARPA, conducted an integrated demonstration of advanced distributed computing technology in an Aegis command and control system context. This major milestone showed that commercial computing technology, distributed computing and fault tolerant replication can be applied to certain real-time command and control, as well as fire control systems.

Demonstrations included interoperability between work stations and scalable computers from four vendors, functional correctness when faced with hardware and system failures, integration of two separately developed subsystems in to a working demonstration in record time and portability of applications between personal computers, work stations and scalable computers.

In addition, the Embeddable Systems Program demonstrated that a new model of interaction can exit for military and commercial computing vendors. The first co-development of a commercial scalable computer and its military embedded variant was produced along with associated software development environments, providing more powerful and shorter development cycles. Early in FY 1995 the embedded Touchstone project will deliver the first general-purpose scalable military computer to support the tens to hundred gigaflop [billion floating-point operations per second] military applications.

High-Performance Scalable Systems and Software. We continue to witness the transfer of ARPA-developed HPC technology to industry, where we are now beginning to see solutions to very unique problems.

Last year, Cray Research, Inc., announced the T3D, their first scalable system integrating vector and massively parallel processing technology. The key technology for this system was developed through a cost-shared agreement with ARPA over the past three years, and the entire system was delivered in only 26 months.

In addition, many other vendors are commercializing ARPA-initiated research, including Intel, Thinking Machines, Convex, Maspar and Kendall Square Research. All are

reporting major new codes supporting breakthroughs in the oil, scientific, financial and medical fields. For example, models running on scalable machines have been used to discover new enzymes for medicine and oil deposits in the ocean, as well as helping in the design of aircraft, automobiles and electromagnetic shielding. Key operating system software capabilities based upon variations of the Mach microkernel have been adapted and used by Intel, Open Software Foundation, Convex and Microsoft in their newest versions.

HPC Networking Initiatives. From the four original computer nodes of the ARPANET of 1969, today's Internet connects approximately 60 countries to 25,000 networks while providing volumes of valuable information to millions of users. However, new protocols and services, including enhanced security, are required. These requirements are part of the ARPA program to ensure scaling as we look into the future 21st century information infrastructure.

ARPA, in conjunction with other federal agencies, has demonstrated a variety of new networking technologies in the HPC developed gigabit test beds. These range from demonstrations of terrain visualization, interactive radiation medical therapy, heterogenous computing, network control and protocols, and network management, among others. In addition, these demonstrations were collaborations among many industrial partners and academic researchers, all focused on the implications of very high performance networking applications.

ARPA Software Program Highlights.

❑ ARPA's ProtoTech program, which focused on developing languages and tools to support the prototyping and analysis of system components, successfully applied several languages to subsystems of the Aegis cruiser in a "fly-off" experiment conducted by the Navy. The demonstration resulted in significant improvements over codes written in Ada (a five-to-10-times improvement in reduced effort and lines of code).

❑ The Software Technology for Adaptable, Reliable Systems program, which supports the evaluation and transition of technology through demonstration projects that focus on architecture-based design, reuse and process-driven development methodologies, completed a technology insertion effort with the U.S. Army Picatinny [N.J.] Arsenal Software Support Activity in the use of the clean-room software engineering process.

The clean-room approach focuses on defect prevention, effectively eliminating costly error removal phases and produces verifiably correct software parts. This initial transition activity extended the capabilities of the clean-room approach, had a 10-to-1 return on investment for the Picatinny SSA and has enabled the organization to win additional software maintenance business in Armywide competition.

❑ The Software Engineering Institute "matured" and transitioned the Rate Monotonic Analysis scheduling approach designed to provide sound engineering bases for ensuring predictable performance of real-time systems. It has had an impact in a number of government and industry programs including the Air Force Pave Pace program.

War Breaker. Under ARPA's War Breaker program, several accomplishments have been realized over the last year:

❑ Initiation of the Multisensor Target Recognition System flight test program. This involved demonstrations of robust automatic target recognition algorithms coupled with fused infrared and millimeter-wave radar sensors.

❑ Demonstration of the capability of advanced interferometric (3-D) synthetic aperture radar to support accurate, real-time terrain mapping;

❑ Completion of the War Breaker Distributed Simulation Experiment — Zen Regard — that demonstrated the first-time utilization of distributed simulation representing a joint battlefield as a systems engineering tool;

❑ Installation and accreditation of the Generic Monitoring System that automatically assesses the status of garrisons;

❑ The image exploitation system, being developed as part of War Breaker's automated intelligence correlation system, established interim performance of 80 percent correct identification of deployed ground order of battle units and cut report generation time in half.

Optoelectronics. The potential for both military and civilian applications for the following examples of optoelectronic applications and recently realized successes illustrates the dual-use nature of this enabling technology:

❑ The reliable Vertical Cavity Surface Emitting Laser technology with low threshold, high-temperature and high-speed operation was demonstrated. The major short-term impact is expected to be high-speed data communication within electronic system cabinets. In the longer term, the technology will significantly improve the performance of laser printers, displays and optoelectronic signal processing.

❑ Successfully demonstrated an 8-by-8 optical crossbar switch interconnecting computer cluster at the National Security Agency. This optical switch has also been commercialized by Optovision.

X-31. ARPA's X-31 program, which has demonstrated a unique vectored thrust capability to achieve superior agility over an expanded flight envelope, culminated in the achievement of several firsts in aviation history. These firsts will underpin the development and operation of future flight vehicles by:

❑ Pioneering flight beyond the stall barrier, demonstrating aggressive maneuvering at angles of attack up to 70 degrees;

❑ Demonstrating the rapid poststall turn now known as the "Herbst Maneuver;" and

❑ Successfully integrating an advanced helmet-mounted display to provide enhanced pilot situational awareness.

The military significance of these demonstrated capabilities is a 10-to-1 exchange ratio in close-in combat against an F-18 fighter.

Environmental (Critical Proof of Concept). Over the years DoD has generated millions of pounds of hazardous wastes, the most toxic of which are chemical and biological agents. The destruction of these is a major concern for the Army.

I am happy to report that last year an ARPA-sponsored program, in a first-of-a-kind test, demonstrated the destruction of nerve agents GB and VX to greater than 99.99999 percent. The technology developed, called

hydrothermal oxidation, utilizes supercritical water and provides for the safe destruction of hazardous wastes in a compact, single-stage process with complete containment of effluent. No NO_x or SO_x airborne particulate were generated.

Rapid Battery Charger. Last year, ARPA demonstrated the charging of a battery for an electric vehicle in less than 18 minutes; the current state-of-the-art for the same battery is eight hours. This demonstration established a new world distance record in a 24-hour period of 831 miles for an electric vehicle.

CMC-RAPTECH. ARPA's Rapid Preforming Technology for Ceramic Matrix Composites Program reduced the time and costs associated with producing prototype and production components from ceramic matrix composites.

Using powder preform shapes created by scanning laser sintering (SLS) at the University of Texas, followed by metal infiltration at Lanxide Inc., particulate reinforced metal matrix composites comparable in performance to mass-produced composites have been produced.

The SLS process creates a part directly from computer files without part-specific tooling or operator interventions. This has greatly reduced the new product time cycle and cost. Process models and simulation software were developed for injection molding of near-net-shaped ceramic preforms building on preceramic polymer technology developed by Hercules and ceramic processing technology developed at Lanxide. As a result, Lanxide has licensed the Hercules preceramic polymer technology and will soon be producing commercial products using the technology.

High-Definition Systems. Recent successes in the High-Definition Systems Program include the development of a liquid crystal display (LCD) in a 4.4-inch diagonal display for the F-15 horizon situation indicator with nearly 20,000 elements; a 6-million-pixel LCD display; a full-color, 19-inch diagonal plasma-type panel; a color 4-by-5-inch electroluminescent panel; and a digital color mirror device with over 2 million moving parts.

The plasma display panel was delivered to the commander in chief, U.S. Army, Europe, for use in the Victory Bastion exercise. This was the first operational evaluation of the utility and requirements for a flat-panel display in command and control at brigade and battalion levels.

Maritime Synthetic Theater of War In the last year we successfully demonstrated a Maritime Synthetic Theater of War. The demonstration integrated a group of undersea models, mockups and trainers into a full-featured anti-submarine warfare and mine-hunting operation virtually situated in the Sea of Japan.

The synthetic exercise was executed over the Defense Simulation Internet, involved participants from Cambridge [Mass.] to Pearl Harbor and included heavy participation by the Surface Warfare Development Group in Little Creek, Va.

We now have tangible evidence that real systems can be immersed into distant, denied or future environments to examine the nuances of specific operational scenarios. The exercise also demonstrated the potential for distributed simulation, not only in training, but in acquisition, doctrine and system evaluation as well.

Infrared Focal Plane Arrays. In the last year ARPA has demonstrated three significant accomplishments in the Infrared Focal Plane Array Program:

- The reproducibility of 480-by-4 infrared focal plane arrays meeting system requirements for land combat systems, infrared search and track, and airborne target acquisition.
- The first large-area (480-by-640 [pixel]) imaging quality, long-wavelength infrared focal plane array operating at 80 degrees K [Kelvin] was produced.
- Established the feasibility of employing larger substrates for producing infrared arrays in both bulk cadmium telluride, increasing the area from 12 cm^2 to 24 cm^2, and in cadmium telluride on silicon (50 cm^2). This has significantly reduced the cost of each array.

Summary

I believe that ARPA's investment strategy and focused research efforts are geared to support the secretary's stated defense challenges that are based on the changing world security environment and declining defense budget.

Central to our investment strategy is a focus on advanced information technology, affordability, dual-use technology research and development, and systems demonstrations. I believe that our focus in these areas, combined with our constant reinforcement of ARPA values, will create the foundations to meet the challenges of the future.
